

**COLLISION REPAIR TECHNOLOGY
SKILL STANDARDS
GRADES 9-14**

Career & Technical Education

Skills for Employment & Lifelong Learning



This document was prepared by:

Office of Career, Technical, and Adult Education
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700 E. Fifth Street
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Adopted by the State Board of Education/
State Board for Career and Technical Education on
April 29, 2006

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Acknowledgements

The development of this skill standards project was a collaborative effort sponsored by the Department of Education and the Center for Workforce Development at the University of Nevada, Las Vegas. Most important, however, is recognition of the time, expertise and great diligence provided by the writing team members in developing the Collision Repair Technology Skill Standards.

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Introduction

The Department of Education has undertaken an ambitious effort to develop statewide occupational skill standards. The standards in this document are for Collision Repair Technology programs, and are designed to clearly state what the Collision Repair Technology student should know and be able to do upon completion of an advanced high school Collision Repair Technology program.

The Collision Repair Technology Standards Writing Team determined that any statewide skill standards for Collision Repair Technology programs must follow, as closely as possible, the nationally-recognized standards established by the National Automotive Technical Education Foundation (NATEF). The writing team reasoned that the NATEF standards, driven by industry and updated on a regular basis, provide a very strong foundation by which to improve all programs in the State of Nevada.

Although these exit-level standards are designed for advanced programs, teachers are encouraged to use them to focus curriculum objectives for entry-level programs as well.

The standards are organized as follows:

Content Standards: Content Standards are general statements that identify major areas of knowledge, understanding, and skills which are expected to be learned by students in key subject and career areas by the end of the program. The Content Standards for Collision Repair Technology are organized according to the technical areas defined by the NATEF standards.

Performance Standards: Following each Content Standard are a number of Performance Standards. Performance Standards identify the more specific components of each content standard and define the expected abilities of students within each content standard.

Performance Indicators: Each Performance Standard is analyzed into specific Performance Indicators according to the degree of difficulty. Performance Indicators are very specific criteria statements for determining whether a student exceeds the standard, meets the standard, or whose performance approaches the standard. Performance Indicators may also be used as learning outcomes which teachers can identify as they plan their program learning objectives.

Furthermore, any knowledge and/or performance assessments should be based on the indicators in those sections.

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COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 1.0: Safety: Student will demonstrate safe work practices while performing operations in the collision repair technology lab.

Performance Standard 1.1 The student will demonstrate adherence to general shop safety rules including but not limited to those listed in the following performance indicators.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Design a general shop safety improvement plan.
MEETS STANDARD	<p>1.1.1 Demonstrate proper use of safety apparel at all times, including but not limited to eye protection, hearing protection, skin protection and protection from airborne particulate matter.</p> <p>1.1.2 Demonstrate the safe use and proper care of hand tools.</p> <p>1.1.3 Demonstrate the safe use and proper care of portable power tools.</p> <p>1.1.4 Demonstrate the safe use and proper care of heavy equipment.</p> <p>1.1.5 Demonstrate the safe handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.</p> <p>1.1.6 Always keep hands, long hair, and tools a safe distance from any rotating parts.</p> <p>1.1.7 Properly exhaust running engines, using an exhaust hose or other apparatus.</p> <p>1.1.8 Demonstrate safe use and maintenance of high pressure hoses and air guns.</p> <p>1.1.9 Always clean asbestos-laden components with an OSHA-approved parts washer.</p> <p>1.1.10 Always ensure a vehicle is properly stationed prior to servicing (i.e., application of the parking brake).</p> <p>1.1.11 Demonstrate proper use of safety stands when working under vehicle.</p> <p>1.1.12 Always use OSHA-approved trouble lights.</p> <p>1.1.13 Always operate OSHA-approved equipment according to the manufacturer’s recommended procedure.</p> <p>1.1.14 Demonstrate knowledge of general shop fire safety procedures and regulations.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify potential general shop safety hazards.

Nevada Academic Standards Correlation: Science (N.12.A.4)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 1.0: Safety: Student will demonstrate safe work practices while performing operations in the collision repair technology lab.

Performance Standard 1.2 The student will demonstrate adherence to specific shop fire safety rules and procedures including but not limited to those listed in the following performance indicators.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Design a fire safety improvement plan.
MEETS STANDARD	<p>1.2.1 Demonstrate proper use of fire extinguishers.</p> <p>1.2.2 Demonstrate knowledge of facility fire evacuation plan.</p> <p>1.2.3 Collect and properly store hazardous liquids in OSHA-approved safety containers.</p> <p>1.2.4 Use only approved cleaning fluids and equipment to clean components.</p> <p>1.2.5 Store all combustible materials in approved safety containers.</p> <p>1.2.6 Never allow sparks or flames near batteries.</p> <p>1.2.7 Demonstrate knowledge of all combustible liquids and gasses (i.e., fuels, solvents, batteries).</p> <p>1.2.8 Demonstrate the safe handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify potential fire safety hazards.

Nevada Academic Standards Correlation: Science (N.12.A.4)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 2.0: Structural Analysis and Damage Repair: Students will demonstrate an understanding of the processes used to inspect a frame, analyze, straighten, align, replace or repair structural components in accordance with vehicle manufacturer’s specifications/ procedures.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 2.1 Students will demonstrate an understanding of the processes involved in frame inspection and repair.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Remove and replace damaged structural components according to manufacturer’s specifications/procedures.
MEETS STANDARD	<p>2.1.1 Diagnose and measure structural damage using tram and self-centering gauges according to manufacturing specifications.</p> <p>2.1.2 Analyze, straighten and align mash (collapse) damage.</p> <p>2.1.3 Inspect, straighten and align sag damage.</p> <p>2.1.4 Analyze, straighten and align side damage.</p> <p>2.1.5 Examine, straighten and align twist damage.</p> <p>2.1.6 Analyze, straighten and align diamond frame damage.</p> <p>2.1.7 Restore corrosion protection to repaired or replaced frame areas.</p> <p>2.1.8 Analyze and identify misaligned or damaged steering, suspension and powertrain components that can cause vibration, steering, and wheel alignment problems.</p> <p>2.1.9 Diagnose and measure structural damage using a universal measuring system (mechanical, electrical, laser).</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Attach vehicle to anchoring devices. • Identify heat limitations in structural components in accordance with vehicle manufacturer’s specifications/procedures. • Restore structural foam in accordance with vehicle manufacturer’s specifications/procedures. • Discuss the extent of the direct and indirect damage and the direction of impact; discuss the methods and sequence of repair.

Nevada Academic Standards Correlation: Math (3.12.2, 3.12.5); Science (N.12.A.4, P.12.B.1, P.12.C.2, P.12.C.5, E.12.A.4)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 2.0: Structural Analysis and Damage Repair: Students will demonstrate an understanding of the processes used to inspect a frame, analyze, straighten, align, and replace or repair structural components in accordance with vehicle manufacturer’s specifications/procedures.

Performance Standard 2.2 The student will be able to inspection and repair a frame.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> Remove and replace damaged sections of structural steel body panels in accordance with manufacturer’s specifications/procedures. Determine the extent of damage to aluminum structural components; repair, weld, or replace in accordance with manufacturer’s specifications/procedures.
MEETS STANDARD	<p>2.2.1 Identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and chassis alignment problems; realign or replace in accordance with vehicle manufacturer’s specifications/procedures.</p> <p>2.2.2 Diagnose and measure unibody damage using tram and self-centering gauges according to industry specifications.</p> <p>2.2.3 Diagnose and measure unibody vehicles using a universal measuring system (mechanical, electronic, laser).</p> <p>2.2.4 Straighten and align cowl assembly.</p> <p>2.2.5 Straighten and align roof rails/headers and roof panels.</p> <p>2.2.6 Straighten and align hinge and lock pillars.</p> <p>2.2.7 Straighten and align vehicle openings, floor pans, and rocker panels.</p> <p>2.2.8 Straighten and align quarter panels, wheelhouse assemblies.</p> <p>2.2.9 Straighten and align rear body sections (including rails and suspension/powertrain mounting points).</p> <p>2.2.10 Straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/powertrain mounting points, etc.).</p>

<p>APPROACHES STANDARD</p>	<ul style="list-style-type: none"> • Inspect the locations of all suspension, steering, and powertrain component attaching points on the vehicle. • Discuss the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair. • Attach anchoring devices to vehicle; remove or reposition components as necessary. • Identify heat limitations in unibody vehicles in accordance with vehicle manufacturer's specifications/procedures. • Identify proper cold stress relief methods. • Repair damage using power tools and hand tools to restore proper contours and dimensions. • Restore corrosion protection to repaired or replaced unibody structural areas. • Store, handle, and install high-pressure gas cylinders. • Determine work clamp (ground) location and attach. • Protect adjacent panels, glass, vehicle interior, etc., from welding and cutting operations. • Protect computers and other electronic control modules during welding procedures according to manufacturer's specifications. • Determine the joint type (butt weld with backing, lap, etc.) welding made according to manufacturer's/industry specifications.
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Nevada Academic Standards Correlation: Math (3.12.2, 3.12.5); Science (P.12.B.1, P.12.C.2, P.12.C.5, E.12.A.4)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 2.0: Structural Analysis and Damage Repair: Students will demonstrate an understanding of the processes used to inspect a frame, analyze, straighten, align, and replace or repair structural components in accordance with vehicle manufacturer’s specifications/procedures.

Performance Standard 2.3 Students will demonstrate an understanding of the processes used to inspect and replace glass.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> Remove and reinstall or replace fixed glass (heated and non-heated) using manufacturer’s specifications/procedures and recommended materials. Remove and reinstall or replace modular glass according to manufacturer’s specifications, procedures and recommendations.
MEETS STANDARD	2.3.1 Inspect vehicles for glass damage. 2.3.2 Determine the manufacturer’s specifications for glass window replacement.
APPROACHES STANDARD	<ul style="list-style-type: none"> Visually inspect glass for damage. Identify heating elements in glass windows.

Nevada Academic Standards Correlation: Math (3.12.2, 3.12.5)

COLLISION REPAIR TECHNOLOGY

Content and Performance Standards

Content Standard 2.0: Structural Analysis and Damage Repair: Students will demonstrate an understanding of the processes used to inspect a frame, analyze, straighten, align, and replace or repair structural components in accordance with vehicle manufacturer's specifications/procedures.

Performance Standard 2.4 Students will demonstrate an understanding of the processes used in metal welding and cutting.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> Weld and cut aluminum according to manufacturer's specifications. Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the material being welded. Identify the cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.
MEETS STANDARD	<p>2.4.1 Identify weldable and non-weldable materials used in collision repair.</p> <p>2.4.2 Weld and cut high-strength steel, and other steels using manufacturer's specifications/procedures.</p> <p>2.4.3 Determine the correct GMAW (MIG) welder type, electrode, wire type, diameter and gas to be used in a specific welding situation.</p> <p>2.4.4 Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.</p> <p>2.4.5 Determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation according to manufacturer's/industry specifications.</p> <p>2.4.6 Perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and lap joints.</p> <p>2.4.7 Perform visual and destructive tests on each weld type.</p> <p>2.4.8 Identify the causes of various welding defects; make necessary adjustments.</p> <p>2.4.9 Identify cutting process for different materials and locations in accordance with manufacturer's procedures; perform cutting operation.</p> <p>2.4.10 Identify different methods of attaching structural components (squeeze type resistance spot welding (STRSW), riveting, structural adhesive, silicone bronze, etc.).</p> <p>2.4.11 Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary and clamp as required.</p>

<p style="text-align: center;">APPROACHES STANDARD</p>	<ul style="list-style-type: none"> • Recognize the weldable and non-weldable materials. • Identify welding equipment used in auto body welding and repair. • Identify different types of welds used in metal repair.
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Nevada Academic Standards Correlation: Math (3.12.2); Science (P.12.B.1, P.12.A.1, P.12.A.5, P.12.A.6, P.12.C.2, P.12.C.5)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 3.0 Nonstructural analysis and damage repair (body components):
Students will demonstrate an understanding of the processes used to inspect, analyze, repair and replace nonstructural components.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 3.1 Students will demonstrate an understanding of the processes involved in preparation of nonstructural inspection and repair.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Apply undercoating to protect underside of vehicle. • Apply seam sealer to appropriate areas after panel replacement.
MEETS STANDARD	<p>3.1.1 Inspect, remove, store, and replace exterior trim and moldings.</p> <p>3.1.2 Evaluate, remove, store, and replace interior trim and components.</p> <p>3.1.3 Inspect, remove, store, and replace nonstructural body panels and components that may interfere with or be damaged during repair.</p> <p>3.1.4 Evaluate, remove, store, and replace all vehicle mechanical and electrical components that may interfere with or be damaged during repair.</p> <p>3.1.5 Remove corrosion protection, undercoatings, sealers, and other protective coatings necessary to perform repairs.</p> <p>3.1.6 Identify, remove, and replace repairable plastics and other components that are recommended for off-vehicle repair.</p> <p>3.1.7 Apply environmental practices associated with vehicle components and systems such as substrates, fluids, refrigerants, batteries, etc.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Review damage report and analyze damage to determine appropriate methods of repair. • Protect panels, glass, and parts adjacent to the repair area. • Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants from those areas to be repaired. • Apply safety procedures associated with vehicle components and systems according to manufacturer's specifications/procedures.

Nevada Academic Standards Correlation: Science (N.12.A.4); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 3.0: Nonstructural analysis and damage repair (body components):
Students will demonstrate an understanding of the processes used to inspect, analyze, repair and replace nonstructural components.

Performance Standard 3.2 Students will demonstrate an understanding of the processes involved in outer body panel repairs, replacements, and adjustments.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Determine the extent of damage to aluminum body panels; repair or replace in accordance with manufacturer’s specifications. • Weld damaged or torn steel body panels; repair broken welds. • Replace door skins according to manufacturer’s procedures. • Perform panel bonding according to manufacturer’s specifications.
MEETS STANDARD	<p>3.2.1 Scrutinize, remove and replace bolted, bonded, or welded steel panel or panel assemblies.</p> <p>3.2.2 Inspect, remove, replace, and align hood, hood hinges, and hood latch.</p> <p>3.2.3 Examine, remove, replace, and align deck lid, lid hinges, and lid latch.</p> <p>3.2.4 Inspect, remove, replace, and align doors, tailgates, hatches, lift gates, latches, hinges, and related hardware.</p> <p>3.2.5 Check, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators, and mounting hardware.</p> <p>3.2.6 Inspect, remove, replace and align front fenders, headers, and other panels.</p> <p>3.2.7 Straighten and rough-out contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pull attachments.</p> <p>3.2.8 Diagnose and repair water leaks, dust leaks, and wind noise.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Discuss the extent of direct and indirect damage and direction of impact; develop and document a repair plan. • Replace corrosion protection. • Restore sound deadeners and foam materials.

Nevada Academic Standards Correlation: Science (P.12.C.2, P.12.C.5, P.12.A.1); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 3.0: Nonstructural analysis and damage repair (body components):
Students will demonstrate an understanding of the processes used to inspect, analyze, repair and replace nonstructural components.

Performance Standard 3.3 Students will demonstrate an understanding of the processes involved in metal finishing and body filling.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Heat shrink stretched panel areas to proper contour according to manufacturer’s specifications.
MEETS STANDARD	<p>3.3.1 Locate and reduce surface irregularities on a damaged body panel.</p> <p>3.3.2 Demonstrate hammer and dolly techniques.</p> <p>3.3.3 Apply body filler; shape during curing.</p> <p>3.3.4 Rough sand cured body filler to contour; finish sand.</p> <p>3.3.5 Cold shrink stretched panel areas to proper contour.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Remove paint from the damaged area of a body panel. • Mix body filler.

Nevada Academic Standards Correlation: Math (2.12.3, 3.12.2, 3.12.5); Science (P.12.B.1); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 3.0: Nonstructural analysis and damage repair (body components):
Students will demonstrate an understanding of the processes used to inspect, analyze, repair and replace nonstructural components.

Performance Standard 3.4 The student will demonstrate an understanding of the processes involved in repairing or replacing movable glass and hardware.	
EXCEEDS STANDARD	
MEETS STANDARD	3.4.1 Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls. 3.4.2 Diagnose and repair water leaks, dust leaks, and wind noises; inspect, repair, and replace weatherstripping.
APPROACHES STANDARD	<ul style="list-style-type: none"> • Inspect, repair or replace, and adjust removable, manually or power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs. • Scrutinize, remove, reinstall, and align convertible top and related mechanisms.

Nevada Academic Standards Correlation: Science (P.12.A.1); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 3.0: Nonstructural analysis and damage repair (body components):
Students will demonstrate an understanding of the processes used to inspect, analyze, repair and replace nonstructural components.

Performance Standard 3.5 Students will demonstrate an understanding of the processes involved in metal welding and cutting.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Weld and cut aluminum using manufacturer’s specifications/procedures. • Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stick-out, voltage, polarity, flow rate, and wire-feed speed required for the material being welded. • Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.
MEETS STANDARD	<p>3.5.1 Identify weldable and non-weldable materials used in collision repair.</p> <p>3.5.2 Determine the correct welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation.</p> <p>3.5.3 Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.</p> <p>3.5.4 Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp as required.</p> <p>3.5.5 Determine the type of weld (continuous, butt weld with backing, plug, etc.) for each specific welding operation according to manufacturer’s/industry specifications.</p> <p>3.5.6 Perform the following welds: continuous, stitch, tack, plug, butt weld with and without backing, and lap joints.</p> <p>3.5.7 Perform visual and destructive tests on each weld type.</p> <p>3.5.8 List the causes of various welding defects; make necessary adjustments.</p> <p>3.5.9 Identify cutting process for different materials and locations in accordance with manufacturer’s procedures; perform cutting operation.</p>

<p>APPROACHES STANDARD</p>	<ul style="list-style-type: none"> • Store, handle, and install high-pressure gas cylinders. • Determine work clamp (ground) location and attach. • Protect adjacent panels, glass, vehicle interior, etc., from welding and cutting operations. • Protect computers and other electronic control modules during welding procedures according to manufacturer's specifications. • Determine the joint type (butt weld with backing, lap, etc.) for weld being made according to manufacturer's/industry specifications.
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Nevada Academic Standards Correlation: Math (3.12.2, 3.12.5); Science (P.12.C.2, P.12.C.5, P.12.B.1); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 3.0: Nonstructural analysis and damage repair (body components):
Students will demonstrate an understanding of the processes used to inspect, analyze, repair and replace nonstructural components.

Performance Standard 3.6 Students will demonstrate an understanding of the processes involved in plastic repair and adhesives.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Remove or repair damaged areas from rigid exterior sheet-molded compound (SMC) panels. • Replace bonded sheet-molded compound (SMC) body panels; straighten or align panel supports.
MEETS STANDARD	<p>3.6.1 Identify the types of plastics repair procedures; clean and prepare the surface of plastic parts.</p> <p>3.6.2 Repair rigid, semi-rigid, and flexible plastic panels according to manufacturer's/industry specifications.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify the types of plastics; determine reparability.

Nevada Academic Standards Correlation: English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 4.0: Mechanical and Electrical Components: Students will demonstrate an understanding of the processes used to identify, inspect, diagnose, and remove mechanical and electrical components as required.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 4.1 Students will demonstrate an understanding in the repair of suspension and steering systems.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Remove, replace, inspect or adjust power steering pump, pulleys, belts, hoses, fittings and pump mounts. • Remove and replace power steering gear (non-rack and pinion type). • Remove and replace power rack and pinion steering gear; inspect and replace mounting bushings, tie rod ends, bellow boots, and brackets; ensure proper mounting location. • Inspect and adjust (where applicable) steering linkage geometry (attitude/parallelism). • Inspect and replace pitman arm. • Examine and replace relay (center link/intermediate) rod. • Check, remove and replace idler arm and mountings. • Inspect, remove and replace tie rod sleeves, clamps, and tie rod ends. • Inspect, remove and replace upper and lower control arms. • Examine, remove and replace upper and lower control arm bushings, shafts and rebound bumpers. • Inspect, remove and replace upper and lower ball joints. • Inspect, remove and replace steering knuckle/spindle/hub assemblies (including bearings, races, seals, etc.). • Examine, remove and replace front suspension system coil springs and spring insulators (silencers). • Examine, remove, replace, and adjust suspension system torsion bars, and inspect mounts. • Inspect, remove, and replace rear suspension system transverse links, control arms, stabilizer bars, bushings, and mounts. • Diagnose, inspect, adjust, repair or replace active

	<p>suspension systems and associated lines and fittings.</p> <ul style="list-style-type: none"> • Inspect, remove, replace, and align front and rear frame (cradles/sub). • Inspect, remove and replace steering shaft U-joint(s), flexible coupling(s), collapsible columns and steering wheels. • Adjust front and rear wheel camber on suspension systems with camber adjustments. • Adjust caster on suspension systems with caster adjustments. • Check and adjust wheel toe including centering steering wheel; determine needed adjustment or repair. • Identify toe-out-on-turns (turning radius) related problems; determine needed repairs. • Identify SAI (steering axis inclination), included angle, and KPI (king pin inclination) related problems; determine needed repairs. • Identify thrust angle related problems; determine needed repairs • Diagnose wheel/tire vibration, shimmy, and tramp (wheel hop) problems; determine needed repairs.
<p>MEETS STANDARD</p>	<p>4.1.1 Identify suspension system fasteners that should not be reused.</p> <p>4.1.2 Inspect, remove and replace steering linkage damper.</p> <p>4.1.3 Inspect, remove and replace stabilizer bar bushings brackets, and links.</p> <p>4.1.4 Examine, remove and replace MacPherson strut cartridge or assembly, upper bearing, and mount.</p> <p>4.1.5 Inspect, remove, and replace suspension system leaf spring(s), leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.</p> <p>4.1.6 Check axle assembly for damage and misalignment.</p> <p>4.1.7 Inspect, remove and replace shock absorbers.</p> <p>4.1.8 Measure vehicle ride height; determine repairs needed.</p> <p>4.1.9 Analyze steering column damage, looseness, and binding problems (including tilt mechanisms); determine repairs needed.</p> <p>4.1.10 Diagnose manual and power steering gear (non-rack and pinion type) noises, binding, uneven turning effort, looseness, hard steering, and fluid leakage problems; determine repairs needed.</p> <p>4.1.11 Diagnose power rack and pinion steering gear noises, vibration, looseness, hard steering, and fluid leakage problems, ensure proper mounting location; determine repairs needed.</p>

	<p>4.1.12 Diagnose non-MacPherson front and rear suspension system noises and body-sway problems; determine repairs needed.</p> <p>4.1.13 Diagnose MacPherson strut suspension system noises and body sway problems; determine repairs needed.</p> <p>4.1.14 Analyze vehicle wandering, pulling, hard steering, bump steer, memory steering, torque steering, and steering return problems; determine repairs needed.</p> <p>4.1.15 Visually check front and rear wheel camber on adjustable and non-adjustable suspension systems; determine repairs needed.</p> <p>4.1.16 Check caster on adjustable and non-adjustable suspension systems; determine repairs needed.</p> <p>4.1.17 Check for front wheel setback; determine repairs needed.</p> <p>4.1.18 Measure wheel, tire, axle, and hub run-out; determine repairs needed.</p>
<p>APPROACHES STANDARD</p>	<ul style="list-style-type: none"> • Diagnose tire pull (lead) problems; determine corrective action. • Inspect tires, identify direction of rotation, and location; check and adjust air pressure. • Reinstall wheels and torque lug nuts according to manufacturer's specifications. • Examine tire wear patterns; determine repairs needed.

Nevada Academic Standards Correlation: Math (3.12.2); Science (P.12.B.1, N.12.A.4); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 4.0: Mechanical and Electrical Components: Students will demonstrate an understanding of the processes used to identify, inspect, diagnose, and remove mechanical and electrical components as required.

Performance Standard 4.2 The student will demonstrate an understanding of the processes involved in electrical components and systems.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Check for voltage drop in the electrical wiring circuits and components with a DMM (digital multimeter). • Inspect, test, and replace fusible links, circuit breakers, and fuses. • Identify programmable electrical/electronic components; record data for reprogramming before disconnecting battery. • Inspect, test, and repair or replace switches, relays, bulbs, sockets, connectors, and wires of all interior and exterior light circuits. • Inspect, remove and replace components of keyless lock/unlock devices and alarm systems. • Analyze, remove and replace components of electrical sunroof and convertible top. • Check for module communication errors using a scan tool. • Use wiring diagrams during diagnosis of electrical circuit problems.
MEETS STANDARD	<p>4.2.1 Check voltages in electrical wiring circuits with a DMM (digital multimeter).</p> <p>4.2.2 Repair electrical circuits, wiring, and connectors according to manufacturer's specifications.</p> <p>4.2.3 Examine, remove and replace power seat, motors, linkages, cables, etc.</p> <p>4.2.4 Inspect, remove and replace components of electric door hatch/trunk lock.</p> <p>4.2.5 Inspect, remove and replace components of power antenna circuits.</p> <p>4.2.6 Examine, clean, and repair or replace battery cables, connectors, and clamps.</p> <p>4.2.7 Verify alignment, adjust, and replace generator (alternator) drive belts, pulleys, and fans.</p> <p>4.2.8 Remove and replace generator (alternator).</p> <p>4.2.9 Demonstrate the proper self-grounding procedures for handling electrical components.</p>

	<p>4.2.10 Dispose of batteries and battery acid according to local, state, and federal requirements.</p> <p>4.2.11 Perform slow/fast battery charge in accordance with manufacturer's recommendations.</p> <p>4.2.12 Check operation of exterior lighting; determine needed repairs.</p> <p>4.2.13 Aim headlamp assemblies and fog/driving lamps; determine needed repairs.</p> <p>4.2.14 Remove and replace horn(s); check operation.</p> <p>4.2.15 Check the operation of windshield wiper/washer system.</p> <p>4.2.16 Verify proper operation of power side windows and power tailgate window.</p> <p>4.2.17 Check operation of electrically heated mirrors, windshields, back lights, panels, etc.; repair as necessary.</p>
<p>APPROACHES STANDARD</p>	<ul style="list-style-type: none"> • Perform battery state-of-charge test; determine needed service. • Inspect, clean, and replace battery.

Nevada Academic Standards Correlation: Math (3.12.2); Science (N.12.A.4, P.12.A.1); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 4.0: Mechanical and Electrical Components: Students will demonstrate an understanding of the processes used to identify, inspect, diagnose, and remove mechanical and electrical components as required.

Performance Standard 4.3 Students will demonstrate an understanding of the processes involved in testing and repairing brake systems.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Pressure test brake hydraulic system; determine needed repair. • Adjust brake shoes; remove and reinstall brake drums or drum/hub assemblies and wheel bearings. • Identify and replace ABS wheel speed sensor components according to manufacturer’s specifications.
MEETS STANDARD	<p>4.3.1 Inspect brake lines and fittings for leaks, dents, kinks, rust, cracks or wear; tighten loose fittings and supports; replace brake lines (double flare and ISO types), hoses, fittings, and supports.</p> <p>4.3.2 Inspect flexible brake hoses for leaks, kinks, cracks, bulging or wear; remove and replace hoses; tighten loose fittings and supports.</p> <p>4.3.3 Bleed (manual, pressure, vacuum or surge) hydraulic brake system in accordance with manufacturer’s procedures.</p> <p>4.3.4 Remove and reinstall caliper assembly.</p> <p>4.3.5 Depressurize ABS hydraulic or electronic system according to manufacturer’s procedures.</p> <p>4.3.6 Identify the proper procedures for handling brake dust.</p> <p>4.3.7 Check for bent or damaged brake system components.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify, handle, store, and install appropriate brake fluids; dispose of in accordance with federal, state, and local regulations. • Reinstall wheel and torque lug nuts according to manufacturer’s specifications. • Clean and inspect caliper mountings for wear and damage. • Check parking brake system operation.

Nevada Academic Standards Correlation: Science (P.12.A.1); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 4.0: Mechanical and Electrical Components: Students will demonstrate an understanding of the processes used to identify, inspect, diagnose, and remove mechanical and electrical components as required.

Performance Standard 4.4 Students will demonstrate an understanding of the processes involved in inspecting and repairing air conditioning.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Remove and replace A/C compressor; inspect, repair or replace A/C compressor mount. • Inspect, repair or replace A/C system mufflers, hoses, lines, fittings, and seals.
MEETS STANDARD	<p>4.4.1 Identify and comply with environmental concerns relating to refrigerants and coolants.</p> <p>4.4.2 Maintain and verify correct operation of certified refrigerant recovery and recharging equipment.</p> <p>4.4.3 Locate and identify A/C system service ports.</p> <p>4.4.4 Identify and recover refrigerant from A/C system.</p> <p>4.4.5 Recycle refrigerant in accordance with EPA regulations.</p> <p>4.4.6 Test recycled refrigerant for non-condensable gases.</p> <p>4.4.7 Evacuate A/C system; check for leaks.</p> <p>4.4.8 Recharge A/C system with refrigerant; perform leak test.</p> <p>4.4.9 Identify oil type and maintain correct amount in A/C system according to manufacturer’s specifications.</p> <p>4.4.10 Inspect, adjust, and replace A/C compressor drive belts; check pulley alignment.</p> <p>4.4.11 Check, test, and replace A/C system condenser and mounts.</p> <p>4.4.12 Examine and replace receiver/drier or accumulator/drier.</p> <p>4.4.13 Inspect and repair A/C component wiring.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify, label, and store refrigerant.

Nevada Academic Standards Correlation: Math (3.12.2, 3.12.5); Science (N.12.A.4, P.12.A.1, N.12.A.4, P.12.B.1); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 4.0 Mechanical and Electrical Components: Students will demonstrate an understanding of the processes used to identify, inspect, diagnose, and remove mechanical and electrical components as required.

Performance Standard 4.5 Students will demonstrate an understanding of the processes involved in the diagnosis and repairing of cooling systems.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Student will safely remove radiator cap, after engine is cooled, preventing injury to technician.
MEETS STANDARD	<p>4.5.1 Check and replace engine cooling and heater system hoses and belts as needed.</p> <p>4.5.2 Inspect, test, remove, and replace radiator, pressure cap, coolant recovery system, and water pump.</p> <p>4.5.3 Recover, refill, and bleed system with proper coolant and check level of protection; leak test system and dispose of materials in accordance with EPA specifications.</p> <p>4.5.4 Remove and replace fan (both electrical and mechanical), fan pulley, fan clutch, and fan shroud.</p> <p>4.5.5 Inspect, remove, and replace auxiliary oil/fluid coolers; check oil levels.</p> <p>4.5.6 Examine, remove, and replace electric fan sensors; check operation.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify all cooling system components. • Identify proper cooling system replacement products.

Nevada Academic Standards Correlation: Math (3.12.2); Science (P.12.A.1, N.12.A.4); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 4.0: Mechanical and Electrical Components: Students will demonstrate an understanding of the processes used to identify, inspect, diagnose, and remove mechanical and electrical components as required.

Performance Standard 4.6 Students will demonstrate an understanding of the processes involved in the repair of drive train systems.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Remove and replace powertrain assembly; inspect, replace, and align powertrain mounts. • Remove and replace drive axle assembly. • Inspect, remove and replace half shafts and axle constant velocity (CV) joints. • Inspect, remove and replace drive shafts and universal joints.
MEETS STANDARD	<p>4.6.1 Remove, replace, and adjust shift or clutch linkage as required.</p> <p>4.6.2 Remove, replace, and adjust cables or linkages for throttle valve (TV), kick-down, and accelerator pedal.</p> <p>4.6.3 Remove and replace electronic sensors, wires, and connectors.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify powertrain mechanical and electrical components.

Nevada Academic Standards Correlation: Math (3.12.2); Science (N.12.A.4); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 4.0: Mechanical and Electrical Components: Students will demonstrate an understanding of the processes used to identify, inspect, diagnose, and remove mechanical and electrical components as required.

Performance Standard 4.7 Students will demonstrate an understanding of the processes involved in the repair or replacement of fuel intake and exhaust systems.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Inspect, remove and replace exhaust pipes, mufflers, converters, resonators, tail pipes, and heat shields.
MEETS STANDARD	<p>4.7.1 Inspect, remove and replace fuel tank, fuel tank filter, fuel cap, fuel filler hose, and inertia switch; inspect and replace fuel lines and hoses; check fuel for contaminants.</p> <p>4.7.2 Check, remove and replace engine components of air intake systems.</p> <p>4.7.3 Inspect, remove and replace canister, filter, vent, and purge lines of fuel vapor (EVAP) control systems.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify the fuel-intake system. • Identify the exhaust system components. • Inspect the fuel tank and exhaust systems.

Nevada Academic Standards Correlation: Science (N.12.A.4); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 4.0: Mechanical and Electrical Components: Students will demonstrate an understanding of the processes used to identify, inspect, diagnose, and remove mechanical and electrical components as required.

Performance Standard 4.8 Students will demonstrate an understanding of the processes involved in active, passive, and supplemental restraint systems diagnostics and repair.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Inspect, remove, replace, and dispose of deployed SRS modules in accordance with manufacturer’s specifications/procedures. • Verify that SRS is operational in accordance with manufacturer’s specifications/procedures. • Inspect, remove, replace, and dispose of non-deployed SRS in accordance with manufacturer’s specifications/procedures. • Diagnose and repair SRS using fault codes and testing equipment.
MEETS STANDARD	<p>4.8.1 Examine, remove, and replace seatbelt and shoulder harness assembly and components in accordance with manufacturer’s specifications/procedures.</p> <p>4.8.2 Check restraint system mounting areas for damage; repair in accordance with manufacturer’s specifications/procedures.</p> <p>4.8.3 Inspect, remove, and replace seatbelt and shoulder harness assembly and components in accordance with manufacturer’s specifications/procedures.</p> <p>4.8.4 Inspect restraint system mounting areas for damage in accordance with manufacturer’s specifications/procedures.</p> <p>4.8.5 Verify proper operation of seatbelt in accordance with manufacturer’s specifications/procedures.</p> <p>4.8.6 Inspect, remove and replace track and drive assembly, lap retractor, torso retractor, inboard buckle-lap retractor, tensioners and knee bolster (blocker) in accordance with manufacturer’s specifications/procedures.</p> <p>4.8.7 Verify proper operation of seatbelt in accordance with manufacturer’s specifications/procedures.</p> <p>4.8.8 Disarm SRS in accordance with manufacturer’s specifications/procedures.</p> <p>4.8.9 Inspect, remove and replace sensors and wiring in accordance with manufacturer’s specifications/procedures; ensure sensor orientation.</p>

APPROACHES STANDARD	<ul style="list-style-type: none">• Identify active, passive, and supplemental restraint systems.• Examine seatbelt and shoulder harness assemblies.
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Nevada Academic Standards Correlation: Math (3.12.2); Science (N.12.A.4); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 5.0: Painting and Refinishing Procedures: Students will demonstrate an understanding of the processes used in painting and refinishing including HSE requirements in accordance with the local, state, and federal safety and environmental regulations.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 5.1 Students will demonstrate an understanding of the processes involved in keeping HSE requirements while in accordance with safety precautions.	
EXCEEDS STANDARD	
MEETS STANDARD	<p>5.1.1 Inspect spray equipment to ensure compliance with applicable regulations, and for safety and cleanliness hazards.</p> <p>5.1.2 Choose and use the NIOSH approved personal sanding respirator. Inspect condition and ensure fit and operation. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.</p> <p>5.1.3 Select and utilize the NIOSH approved personal painting/refinishing respirator system. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.</p> <p>5.1.4 Select and use the proper personal safety equipment for various shop operations (i.e., gloves, suits, hoods, eye and ear protection, etc.).</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify and take necessary precautions with hazardous operations and materials including VOCs according to federal, state, and local regulations. • Identify safety and personal health hazards according to OSHA guidelines and the “Right to Know Law.”

Nevada Academic Standards Correlation: Science (N.12.A.4); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 5.0: Painting and Refinishing Procedures: Students will demonstrate an understanding of the processes used in painting and refinishing including HSE requirements in accordance with the local, state, and federal safety and environmental regulations.

Performance Standard 5.2 Students will demonstrate an understanding of the processes involved in surface preparation.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Prepare plastic panels for refinishing.
MEETS STANDARD	<p>5.2.1 Inspect, remove, store, and replace exterior trim and components necessary for proper surface preparation.</p> <p>5.2.2 Inspect and identify substrate, type of finish and surface condition; develop and discuss a plan for refinishing using a total product system.</p> <p>5.2.3 Prepare paint finish in accordance with manufacturer’s recommendations.</p> <p>5.2.4 Apply suitable metal treatment or primer in accordance with total product systems.</p> <p>5.2.5 Mix primer, primer-surfacer or primer-sealer.</p> <p>5.2.6 Apply primer onto surface of repaired area.</p> <p>5.2.7 Apply two-component finishing filler to minor surface imperfections.</p> <p>5.2.8 Dry or wet sand area to which primer-surfacer has been applied.</p> <p>5.2.9 Dry sand area to which two-component finishing filler has been applied.</p> <p>5.2.10 Apply suitable sealer to the area being refinished when sealing is needed or desirable.</p> <p>5.2.11 Scuff sand to remove nibs or imperfections from a sealer.</p> <p>5.2.12 Apply stone chip resistant coating.</p> <p>5.2.13 Restore corrosion-resistant coatings, caulking, and seam sealers to repaired areas.</p> <p>5.2.14 Prepare adjacent panels for blending.</p>

<p>APPROACHES STANDARD</p>	<ul style="list-style-type: none"> • Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants. • Dry or wet sand areas to be refinished. • Featheredge damaged areas to be refinished. • Mask and protect other areas that will not be refinished. • 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.
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Nevada Academic Standards Correlation: Math (2.12.3); Science (P.12.A.1, P.12.A.3); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 5.0: Painting and Refinishing Procedures: Students will demonstrate an understanding of the processes used in painting and refinishing including HSE requirements in accordance with the local, state, and federal safety and environmental regulations.

Performance Standard 5.3 Students will demonstrate an understanding of the processes involved in spray gun and related equipment operations.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Student will strain materials preventing clogging. • Identify all moving parts of a spray gun.
MEETS STANDARD	<p>5.3.1 Check and adjust spray gun operation for HVLP (high volume, low pressure) or LVLP (low volume, low pressure) guns.</p> <p>5.3.2 Set-up (fluid needle, nozzle, and cap), adjust, and test spray gun using fluid, air, and pattern control valves.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment).

Nevada Academic Standards Correlation: Math (2.12.3, 3.12.2, 3.12.5); Science (P.12.A.1, N.12.A.4); English (4.12.6)

**COLLISION REPAIR TECHNOLOGY
Content and Performance Standards**

Content Standard 5.0 Painting and Refinishing Procedures: Students will demonstrate an understanding of the processes used in painting and refinishing including HSE requirements in accordance with the local, state, and federal safety and environmental regulations.

Performance Standard 5.4 Students will demonstrate an understanding of the processes involved in paint mixing, matching and applying.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Apply basecoat/clearcoat for panel blending or partial refinishing to achieve invisible repair. • Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials, preparation, and refinishing procedures. • Apply multi-stage (tricoat) coats for panel blending or overall refinishing. • Tint color using formula to achieve a blendable match.
MEETS STANDARD	<p>5.4.1 Shake, stir, reduce, catalyze/activate, and strain paint according to manufacturer's procedures.</p> <p>5.4.2 Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied.</p> <p>5.4.3 Select product, apply on test panel and let-down panel in accordance with manufacturer's recommendations; check for color match.</p> <p>5.4.4 Apply single stage topcoat for refinishing.</p> <p>5.4.5 Apply basecoat/clearcoat for overall refinishing.</p> <p>5.4.6 Denib, buff, and polish finishes where necessary.</p> <p>5.4.7 Refinish rigid, semi-rigid and flexible plastic parts.</p> <p>5.4.8 Identify and mix paint using a formula.</p> <p>5.4.9 Identify poor hiding colors; determine necessary action.</p> <p>5.4.10 Verify alternative color formula to achieve a blendable match.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Determine type and color of paint already on vehicle by manufacturer's vehicle information label.

Nevada Academic Standards Correlation: Math (2.12.3, 3.12.2); Science (N.12.A.4); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 5.0: Painting and Refinishing Procedures: Students will demonstrate an understanding of the processes used in painting and refinishing including HSE requirements in accordance with the local, state, and federal safety and environmental regulations.

Performance Standard 5.5 Students will demonstrate an understanding of the processes involved in identifying paint defects.	
EXCEEDS STANDARD	
MEETS STANDARD	<p>5.5.1 Identify blistering (rising of the paint surface); determine the cause(s) and correct the condition.</p> <p>5.5.2 Identify blushing (milky or hazy formation); determine the cause(s) and correct the condition.</p> <p>5.5.3 Identify a dry spray appearance in the paint surface; determine the cause(s) and correct the condition.</p> <p>5.5.4 Identify the presence of fish-eyes (crater-like openings) in the finish; determine the cause(s) and correct the condition.</p> <p>5.5.5 Identify lifting; determine the cause(s) and correct the condition.</p> <p>5.5.6 Identify clouding (mottling and streaking in metallic finishes); determine the cause(s) and correct the condition.</p> <p>5.5.7 Check for orange peel; determine the cause(s) and correct the condition.</p> <p>5.5.8 Check for overspray; determine the cause(s) and correct the condition.</p> <p>5.5.9 Identify solvent popping in freshly painted surface; determine the cause(s) and correct the condition.</p> <p>5.5.10 Visually identify sags and runs in paint surface; determine the cause(s) and correct the condition.</p> <p>5.5.11 Identify sanding marks (sandscratch swelling); determine the cause(s) and correct the condition.</p> <p>5.5.12 Identify contour mapping (shrinking and splitting) while finish is drying; determine the cause(s) and correct the condition.</p> <p>5.5.13 Determine color difference (off-shade), the cause(s) and correct the condition.</p> <p>5.5.14 Identify tape tracking; determine the cause(s) and correct the condition.</p> <p>5.5.15 Identify low gloss condition; determine the cause(s) and correct the condition.</p> <p>5.5.16 Test for poor adhesion; determine the cause(s) and correct the condition.</p>

	<p>5.5.17 Identify paint cracking (crowsfeet or line-checking, micro-checking, etc.), determine the cause(s) and correct the condition.</p> <p>5.5.18 Spot corrosion; determine the cause(s) and correct the condition.</p> <p>5.5.19 Identify dirt or dust in the paint surface; determine the cause(s) and correct the condition.</p> <p>5.5.20 Look at water spotting; determine the cause(s) and correct the condition.</p> <p>5.5.21 Physically identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.</p> <p>5.5.22 Identify finish damage caused by airborne contaminants (acids, soot, and other industrial-related causes); correct the condition.</p> <p>5.5.23 Identify die-back conditions (dulling of the paint film showing haziness); determine the cause(s) and correct the condition.</p> <p>5.5.24 Check for chalking (oxidation); determine the cause(s) and correct the condition.</p> <p>5.5.25 Identify bleed-through (staining); determine the cause(s) and correct the condition.</p> <p>5.5.26 Identify pinholing; determine the cause(s) and correct the condition.</p> <p>5.5.27 Visually identify buffing-related imperfections (swirl marks, wheel burns); correct the condition.</p> <p>5.5.28 Identify pigment flotation (color change through film build); determine the cause(s) and correct the condition.</p>
<p>APPROACHES STANDARD</p>	<ul style="list-style-type: none"> • Identify preparation defects. • Identify and list basic painting defects.

Nevada Academic Standards Correlation: Science (N.12.A.4); English (4.12.6)

**COLLISION REPAIR TECHNOLOGY
Content and Performance Standards**

Content Standard 5.0: Painting and Refinishing Procedures: Students will demonstrate an understanding of the processes used in painting and refinishing including HSE requirements in accordance with the local, state, and federal safety and environmental regulations.

Performance Standard 5.6 Students will demonstrate an understanding of the processes involved in completing the final details.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Buff and polish the finish to remove defects as required. • Remove overspray.
MEETS STANDARD	5.6.1 Apply decals, transfers, tapes, woodgrains, pinstripes (painted and taped), etc.
APPROACHES STANDARD	<ul style="list-style-type: none"> • Clean interior, exterior, and glass. • Clean body openings (door jambs and edges, etc.).

Nevada Academic Standards Correlation: Science (N.12.A.4); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 6.0: Estimating: Students will demonstrate an understanding of the processes used to estimate collision-related repairs.

Performance Standard 6.1 Students will demonstrate an understanding of the processes involved in damage reports.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Research the features of computer-generated estimates. • Know and apply the symbols found on computer-generated reports and what the symbols indicate. • Identify the various reasons for overrides on computer-generated report.
MEETS STANDARD	<p>6.1.1 Locate and use the information in the procedure pages.</p> <p>6.1.2 Explain the areas of a handwritten damage report.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify and use recommended safety equipment. • Follow general safety guidelines when working in the shop area.

Nevada Academic Standards Correlation: English (9.12.2)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 6.0: Estimating: Students will demonstrate an understanding of the processes used to estimate collision-related repairs.

Performance Standard 6.2 Students will demonstrate an understanding of the industry definitions used in collision repair estimating.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Identify various alignment operations that appear on a damage report and define each.
MEETS STANDARD	<p>6.2.1 List common terms found on damage report and provide examples of each.</p> <p>6.2.2 Define the term “additional time” and identify examples.</p> <p>6.2.3 Explain the difference between pre-existing damage and collision-related damage.</p> <p>6.2.4 List the different labor categories (structural and mechanical) and define each.</p> <p>6.2.5 Define sublet and identify common examples.</p> <p>6.2.6 Explain refinishing operations including paint and materials.</p> <p>6.2.7 Define overlap and identify common examples.</p> <p>6.2.8 List detailing and identify common examples.</p> <p>6.2.9 Define “included” and “not included” operations and identify examples of each.</p> <p>6.2.10 Define additional operations and provide examples.</p> <p>6.2.11 Compare the difference between flat rate and labor rate and where these rates are typically found.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify and use recommended safety equipment. • Follow general safety guidelines when working in the shop area.

Nevada Academic Standards Correlation: English (9.12.2)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 6.0: Estimating: Students will demonstrate an understanding of the processes used to estimate collision-related repairs.

Performance Standard 6.3 Students will demonstrate an understanding of the processes involved in identifying the different types of automotive finishes.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Measure mil thickness and correctly identify proper film thickness and excessive film thickness. • Define the different types of corrosion.
MEETS STANDARD	<p>6.3.1 Explain the purpose of seam sealers and identify the different types and characteristics.</p> <p>6.3.2 Identify the various types of finishes and define the differences between them.</p> <p>6.3.3 Look at a finish and identify previously repaired areas and environmental changes.</p> <p>6.3.4 List reasons for blending and how it may affect paint warranties.</p> <p>6.3.5 Explain why corrosion protection must be reapplied during the repair.</p> <p>6.3.6 Calculate surface refinishing labor units and identify included and not included refinishing operations.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Measure mil thickness. • Identify three automotive finishes. • Explain the purposes of various automotive finishes.

Nevada Academic Standards Correlation: Math (3.12.2); English (9.12.2)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 6.0: Estimating: Students will demonstrate an understanding of the processes used to estimate collision-related repairs.

Performance Standard 6.4 Students will demonstrate an understanding of the processes involved in obtaining important information.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Locate and decode vehicle identification information.
MEETS STANDARD	<p>6.4.1 Identify information that should be obtained before beginning the damage analysis.</p> <p>6.4.2 List different types of labels and plates required to comply with local and national regulations.</p> <p>6.4.3 Know the location of the paint code, finish identification information, and vehicle option label.</p> <p>6.4.4 Explain the purpose of anti-theft labels and replacement part labels and identify common parts that display these labels.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify locations on a vehicle that contain vital information. • Locate anti-theft labels on a vehicle.

Nevada Academic Standards Correlation: English (9.12.2)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 6.0: Estimating: Students will demonstrate an understanding of the processes used to estimate collision-related repairs.

Performance Standard 6.5 Students will demonstrate an understanding of the processes involved in writing a damage report.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Properly list all information on an estimate. • Understand sublet. • Memorize local sales tax percentages.
MEETS STANDARD	<p>6.5.1 Record the proper vehicle information.</p> <p>6.5.2 Calculate totals and subtotals of the damage estimate.</p> <p>6.5.3 Include additional costs in the damage estimate.</p> <p>6.5.4 Define hidden damage.</p> <p>6.5.5 List supplements and explain why they can be sources of conflict.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Review a properly prepared damage report.

Nevada Academic Standards Correlation: Math (3.12.2); English (6.12.3)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 7.0: Employability Skills: Students will achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 7.1 Students will demonstrate problem-solving skills.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Evaluate the benefits of solving a work-related problem. • Identify problems that can be minimized/solved by preventative maintenance procedures. • Develop a flowchart using appropriate symbols and terminology to solve problems • Interpret computer-generated data to troubleshoot a problem.
MEETS STANDARD	<p>7.1.1 Solve a collision and/or refinishing problem using the appropriate steps to achieve pre-accident condition.</p> <p>7.1.2 Demonstrate brainstorming techniques.</p> <p>7.1.3 Examine and explain the advantages and disadvantages of alternative solutions to one or more problems.</p> <p>7.1.4 Create an action plan based upon a solution to a work-related problem.</p> <p>7.1.5 Identify the benefits of solving a work-related problem.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify the basic steps in the problem-solving process. • Identify alternative solutions to solve a problem. • Identify basic steps needed to repair the vehicle. • Identify the knowledge of common flow charts and its components. • Utilize computers and other forms of information used to access data to solve problems.

Nevada Academic Standards Correlation: Science (N.12.A.2, N.12.A.3); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 7.0: Employability Skills: Students will achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 7.2 Students will demonstrate critical-thinking skills.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Analyze how critical-thinking skills affect work performance. • Formulate, implement, and evaluate an action plan. • Demonstrate the skills necessary to identify, analyze, and solve a design problem.
MEETS STANDARD	<p>7.2.1 Identify and explain the essential elements of the critical-thinking process.</p> <p>7.2.2 Demonstrate critical-thinking skills necessary in the workplace.</p> <p>7.2.3 Explain how emotional thinking and logical thinking affect decision making in the workplace.</p> <p>7.2.4 Explain the difference between reliable and unreliable observations and statements of facts.</p> <p>7.2.5 Recognize patterns or relationships through observation and discovery.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify the importance of thinking skills in analyzing and offering solutions to repair issues. • Identify the essential steps of critical thinking. • Identify the basic components of an action plan.

Nevada Academic Standards Correlation: Science (N.12.B.3); English (4.12.6, 9.12.2)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 7.0: Employability Skills: Students will achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 7.3 Students will demonstrate the ability to speak, write and listen effectively.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Demonstrate exemplary customer service skills. • Interpret and respond to verbal and nonverbal messages. • Compete in a SkillsUSA job skill demonstration and/or public speaking contest.
MEETS STANDARD	<p>7.3.1 Communicate thoughts, ideas, and information in writing as required for warranty and supplemental repair orders.</p> <p>7.3.2 Explain the benefits of effective communication skills in the workplace.</p> <p>7.3.3 Effectively interpret and respond to verbal and nonverbal messages.</p> <p>7.3.4 Effectively communicate thoughts, ideas and information in writing.</p> <p>7.3.5 Organize ideas and communicate orally; is able to effectively demonstrate job skills to others.</p> <p>7.3.6 Locate, understand and interpret written information in documents such as manuals, schedules and repair orders.</p> <p>7.3.7 Organize information into the appropriate format in accordance with standard practices, which includes prewriting, drafting, proofreading, editing/revising, and preparing final copy.</p> <p>7.3.8 Identify common communication barriers and methods for improving communication.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Demonstrate proper telephone etiquette. • Demonstrate active listening skills. • Select and utilize an appropriate medium for conveying messages with dignity and respect. • Demonstrate sensitivity to cultural diversity in communication.

Nevada Academic Standards Correlation: Science (N.12.A.3); English (4.12.6, 7.12.2, 9.12.2)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard: 7.0: Employability Skills: Students will achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 7.4 Students will demonstrate the ability to select, apply and maintain appropriate technology.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Critique the use, benefits and cost of technologically advanced tools and equipment. • Analyze the impact of technological changes on one or more aspects of collision repair by researching current literature. • Compete in a SkillsUSA collision repair technology contest.
MEETS STANDARD	<p>7.4.1 Demonstrate ability to utilize other input devices.</p> <p>7.4.2 Demonstrate ability to utilize various electronic research methods.</p> <p>7.4.3 Demonstrate knowledge of the basic technology systems currently available and how they apply to your field (i.e., word processing, spreadsheets, multimedia applications and database).</p> <p>7.4.4 Investigate and explain the use, benefits, and costs of technological developments in workplace and school.</p> <p>7.4.5 Demonstrate routine maintenance and repair of technological equipment.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Demonstrate ability to utilize basic keyboarding techniques. • Identify and demonstrate the appropriate use of technology to enhance the efficiency of the workplace and school. • Recognize the impact of essential technological changes on the auto collision repair industry as reported in current literature. • Identify appropriate technology for repairing automotive systems.

Nevada Academic Standards Correlation: Science (N.12.A.2, N.12.A.4); English (4.12.6)

**COLLISION REPAIR TECHNOLOGY
Content and Performance Standards**

Content Standard 7.0: Employability Skills: Students will achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 7.5 Students will demonstrate leadership and teamwork skills.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Demonstrate leadership ability within a group or a team. • Acknowledge and utilize the skills, abilities, and input of all members of the team. • Demonstrate leadership by listening to others and asking appropriate questions to clarify a problem or issue. • Compromise and/or build consensus within a group and summarize the decision of the group while maintaining respect for diverse viewpoints. • Compete in a SkillsUSA Professional Development Program. • Campaign for a local SkillsUSA chapter office. • Serve on a committee for a local SkillsUSA chapter.
MEETS STANDARD	<p>7.5.1 Work cooperatively with others when given a group project.</p> <p>7.5.2 Explain traits necessary to effectively lead and influence individuals and groups.</p> <p>7.5.3 Demonstrate appropriate attitudes and behaviors for effective leadership.</p> <p>7.5.4 Participate in the implementation of a group’s decision and evaluate the results.</p> <p>7.5.5 Demonstrate the qualities of an effective leader and team member.</p> <p>7.5.6 Display ownership and confidence in work.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Demonstrate respect for team members, team processes and team goals. • Describe the importance of company dress codes. • Establish credibility through competence and integrity.

Nevada Academic Standards Correlation: English (9.12.2)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 7.0: Employability Skills: Students will achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 7.6 Students will demonstrate sound workplace ethics.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Demonstrate time-management skills and cost-effective practices. • Assume responsibility for decisions and actions. • Demonstrate time-management and cost-effectiveness practices.
MEETS STANDARD	<p>7.6.1 Develop personal work ethics through work experience.</p> <p>7.6.2 Describe the importance of ethics practiced in the workplace.</p> <p>7.6.3 Demonstrate regular attendance, promptness, and the willingness to follow instructions and complete an assigned task.</p> <p>7.6.4 Demonstrate appropriate personal and professional attitudes and behaviors.</p> <p>7.6.5 Maintain a safe, clean, and organized work area.</p> <p>7.6.6 Demonstrate awareness of legal responsibilities related to individual performance, safety and customer satisfaction.</p> <p>7.6.7 Demonstrate knowledge of various types of harassment.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List the important ethics in the workplace. • Meet attendance standards. • Comply with all safety and health rules and procedures. • Identify hazardous substances in the workplace. • Describe an organized workplace. • Gain an understanding and follow emergency procedures. • Identify appropriate responses to unethical actions.

Nevada Academic Standards Correlation: Science (N.12.A.4, N.12.B.3); English (4.12.6, 9.12.2)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 7.0: Employability Skills: Students will achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 7.7 Students will demonstrate the ability to effectively manage resources in high performance workplaces.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Recognize the individual roles of team members. • Acknowledge and utilize the skills, abilities, and input of all members of a team. • Develop an action plan to accomplish tasks within a given time frame.
MEETS STANDARD	<p>7.7.1 Identify and organize the human resources needed to complete a job assignment.</p> <p>7.7.2 Identify and organize the material resources and space requirements needed to complete a job assignment.</p> <p>7.7.3 Effectively use technology at its highest level to complete a job assignment.</p> <p>7.7.4 Demonstrate cooperation and leadership in a team at school or in a workplace setting.</p> <p>7.7.5 Use the basic components of effective time management.</p> <p>7.7.6 Recognize the need for management skills in the workplace with regard to stress, anger management and substance abuse.</p> <p>7.7.7 Estimate costs and prepare a detailed work order.</p> <p>7.7.8 Develop a time schedule and prioritized task list to complete a job assignment.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List effective time management skills. • Use technology to complete assignments. • Utilize materials, tools, and processes to complete a task related to a career selection. • Read and follow instructions from manuals on the use and care of materials, tools, and equipment. • Maintain a clean, organized, and safe job site. • Identify traits needed for cooperation and leadership in a team at school or in a workplace. • Identify the material resources and space requirements needed to complete an assignment.

Nevada Academic Standards Correlation: Science (N.12.A.1); English (4.12.6)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 7.0: Employability Skills: Students will achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 7.8 Students will demonstrate career planning and development skills.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Develop a community service or job shadowing project. • Develop an education/training plan to fulfill long-term career goals. • Define advantages and disadvantages of self employment or working for various sizes and types of businesses. • Critique results of a job interview. • Develop a proposal for an organized community service project. • Compete in a state-level SkillsUSA job interview contest.
MEETS STANDARD	<p>7.8.1 Prepare a job application.</p> <p>7.8.2 Prepare a personal résumé.</p> <p>7.8.3 Complete a personal aptitude and interest inventory.</p> <p>7.8.4 Participate in a job interview.</p> <p>7.8.5 Establish short-term career goals.</p> <p>7.8.6 Establish long-term career goals.</p> <p>7.8.7 Use the Nevada Career Information System (NCIS) or a similar computer-based program to research careers in a chosen field.</p> <p>7.8.8 Participate in an organized job-shadowing activity.</p> <p>7.8.9 Participate in a community service project.</p> <p>7.8.10 Construct a career portfolio.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Locate employment opportunities. • Identify job requirements for entry-level positions in the collision repair industry. • Identify general conditions for employment. • Identify educational/training requirements for related collision repair field. • Identify the elements of goal setting. • Identify collision repair related careers. • Describe essential job interview skills. • Identify the components of a career portfolio.

Nevada Academic Standards Correlation: English (4.12.6, 6.12.1, 6.12.3, 9.12.2)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 7.0: Employability Skills: Students will achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 7.9 Students will demonstrate the ability of job-retention and lifelong learning skills.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Maintain an electronic portfolio. • Create a plan for lifelong learning. • Create a presentation illustrating interpersonal skills needed for job retention. • Adapt new knowledge and skills in changing situations. • Analyze how work life is affected by families and how families are affected by work life.
MEETS STANDARD	<p>7.9.1 Maintain an employment/career portfolio.</p> <p>7.9.2 Identify strategies for balancing work and family roles.</p> <p>7.9.3 Demonstrate understanding of the need for lifelong learning in a rapidly changing job market.</p> <p>7.9.4 Identify strategies to maintain employment in the face of job reductions.</p> <p>7.9.5 Develop long-term career-planning strategies.</p> <p>7.9.6 Identify various educational options needed for job advancement.</p> <p>7.9.7 Demonstrate interpersonal skills needed for job retention.</p> <p>7.9.8 Identify and model sound workplace ethics, such as loyalty, punctuality and initiative.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Describe the importance of a portfolio. • Identify options for lifelong learning. • Identify interpersonal skills needed for job retention. • Identify jobs with opportunities for advancement. • Describe the importance of career planning.

Nevada Academic Standards Correlation: English (6.12.3)

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 8.0: Students will demonstrate an understanding and use of language arts related academic skills.

Performance Standard 8.1 Students will demonstrate an understanding of the following language arts and communications-related academic skills that are embedded in the occupation.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Request, collect, comprehend, evaluate, and apply oral and written information gathered from customers, associates, and supervisors regarding problem symptoms and potential solutions to problems. • Write warranty reports and work orders to include information regarding problem resolution and the results of the work performed for the customer or manufacturer. • Comprehend and apply industry definitions and specifications to diagnose and solve problems in all systems and components of the automobile and light duty trucks. • Comprehend and use problem-solving techniques and decision trees that are contained in service manuals and databases to determine cause-and-effect relationships.
MEETS STANDARD	<p>8.1.1 Adapt a reading strategy for all written materials, e.g., customer's notes, service manuals, shop manuals, technical bulletins, etc., relevant to problem identification, diagnosis, solution, and repair.</p> <p>8.1.2 Attend to verbal and nonverbal cues in discussions with customers, supervisors, and associates to verify, identify, and solve problems.</p> <p>8.1.3 Use study habits and techniques, i.e., previewing, scanning, skimming, taking notes, etc., when reviewing publications (shop manuals, references, databases, operator's manuals, and text resources) for problem solving, diagnosis, and repair.</p> <p>8.1.4 Use prior knowledge learned from solving similar problems to diagnose and repair specific problems.</p> <p>8.1.5 Write clear, concise, complete, and grammatically accurate sentences and paragraphs.</p> <p>8.1.6 Scan service manuals and databases to locate specific information for problem-solving purposes.</p> <p>8.1.7 Use the service manual to identify the manufacturer's specifications for system parameters, operations, and potential malfunctions.</p> <p>8.1.8 Interpret charts, tables, or graphs to determine the manufacturer's specifications for systems operations to</p>

	<p>identify out-of-tolerance systems and subsystems.</p> <p>8.1.9 Supply clarifying information to customers, associates, parts suppliers, and supervisors.</p>
<p>APPROACHES STANDARD</p>	<ul style="list-style-type: none"> • Follow all oral/written directions that relate to the task or system under study.

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 9.0: Students will demonstrate an understanding and use of mathematics-related academic skills.

Performance Standard 9.1 Students will demonstrate an understanding of the mathematics-related academic skills that are embedded in the occupation.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Convert variables presented orally to a mathematical form that allows for an algebraic solution. • Use English and metric volume measurement techniques to determine the volume of a system, component, or cylinder. • Use convectional symbols (E for voltage, etc.) to solve circuit parameter calculations using formulas such as Ohm’s Law, $E=IR$. • Solve problems that involve determining the relative proportion of the desired versus undesired ingredients or elements of a mixture, and determine if that proportion is within the manufacturer’s specifications. • Measure and/or test with tools designed for English or metric measurements, then convert the result to the manufacturer’s system used for specifying the correct measurement or tolerance.
MEETS STANDARD	<p>9.1.1 Determine the proper sequence of arithmetic operations that are needed to arrive at a solution, then compare those system measurements or tolerances to the manufacturer’s specifications.</p> <p>9.1.2 Add two or more whole numbers, fractions, or decimals to determine component conformance of multiple measurements with the manufacturer’s specifications.</p> <p>9.1.3 Subtract whole numbers, fractions, or decimals to arrive at a difference for comparison with the manufacturer’s specifications.</p> <p>9.1.4 Multiply whole numbers, fractions, or decimals to arrive at a solution for comparison with the manufacturer’s specifications.</p> <p>9.1.5 Divide decimals to determine measurement conformance with the manufacturer’s specifications.</p> <p>9.1.6 Estimate the results of basic arithmetic operations, and accurately round up or down depending on the appropriate rule for the situation.</p> <p>9.1.7 Analyze and solve problems requiring the use of fractions, decimals, ratios, or percentages by a direct or indirect variation of the numerical elements of the</p>

	<p>problem.</p> <p>9.1.8 Determine the irrelevant and/or missing data needed to solve a problem.</p> <p>9.1.9 Determine and interpret place value (tenths, hundredths, thousandths) when conducting precision measurements.</p> <p>9.1.10 Use Centigrade or Fahrenheit measurement scales to determine the existing temperature of substances such as a coolant, lubricant, compound, or finish material.</p> <p>9.1.11 Understand that if the described problem has certain conditions (symptoms), then a limited number of solutions to the problem apply.</p> <p>9.1.12 Understand the relationship between the frequency of the occurrence of a problem (symptom) and the probability of accurately predicting the problem.</p> <p>9.1.13 Calculate the average (mean) of several measurements to determine the variance from the manufacturer's specifications.</p> <p>9.1.14 Use English and metric angle and distance measurements and techniques to determine parallel lines, perpendicular lines, and angle variances from the manufacturer's specifications.</p> <p>9.1.15 Compute mentally whether the observed measurement is out-of-tolerance when comparing the observed measurement to the manufacturer's specifications.</p> <p>9.1.16 Distinguish whether a measurement or tolerance is equal or not equal to the manufacturer's specifications.</p> <p>9.1.17 Comprehend and use standards defined by each manufacturer for the component or system being analyzed and repaired.</p> <p>9.1.18 Convert test readings that are in decimal or fraction form to a ratio or percent for comparison with the manufacturer's specifications for the subsystem under review.</p> <p>9.1.19 Know when to use an estimated performance value versus an exact value, basing the decision on the system being analyzed or repaired.</p> <p>9.1.20 Visually perceive the geometric relationship of systems and sub-systems that require alignment.</p> <p>9.1.21 Construct or interpret a chart, table, graph, or symbol that depicts a range of performance characteristics that can be used for comparing various system operational conditions.</p> <p>9.1.22 Use measurement devices to determine the parallelism or perpendicularity of chassis, suspension, and other vehicle components requiring geometric alignment.</p> <p>9.1.23 Use formulas to indirectly confirm that systems are</p>
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	<p>outside of the manufacturer's specifications.</p> <p>9.1.24 Verify that the relationship between parallel lines and angles concurs with the manufacturer's specifications when diagnosing a system's malfunction.</p> <p>9.1.25 Formulate an angle visually and verify conformance to the manufacturer's specified angle.</p> <p>9.1.26 Measure timed or sequenced parameters to determine conformance with the manufacturer's specifications.</p> <p>9.1.27 Use English and metric scales to determine the conformance of components to the manufacturer's specified weight.</p> <p>9.1.28 Determine the degree of conformance to the manufacturer's specifications for length, volume, and other appropriate measurements in the English and/or metric system.</p> <p>9.1.29 Distinguish the congruence of the measured tolerances with those specified by the manufacturer.</p>
<p>APPROACHES STANDARD</p>	<ul style="list-style-type: none"> • Apply basic math skills. • Apply Algebra skills to solve related problems.

COLLISION REPAIR TECHNOLOGY
Content and Performance Standards

Content Standard 10.0: Students will demonstrate an understanding of the science-related academic skills.

Performance Standard 10.1 Students will demonstrate an understanding of the science-related academic skills that are embedded in the occupation.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Demonstrate an understanding of the total color spectrum by explaining the roles different colors play in different mixtures and finishes. • Explain color and shades of color based on how light hits or passes through it. • Explain the difference between the principles of translucent light (diffuses) as contrasted to transparent light (passes through). • Demonstrate an understanding of and discuss relative humidity in terms of effect on paint and substance applications. • Identify the effect of the pH of a solution on chemical changes in a system. • Use direct and indirect methods to measure system temperatures and then convert to Fahrenheit/Centigrade as required for proper cure and application times. • Use computer databases for information retrieval and input devices to process information for customers, billing purposes, warranty work, and other record-keeping purposes. • Explain and demonstrate an understanding of the role of a fuse or fusible link as a protective device in an electrical or electronic circuit.
MEETS STANDARD	<p>10.1.1 Convert measurements taken using the English or metric system to specifications stated in terms of either system.</p> <p>10.1.2 Demonstrate an understanding of the chemical reaction that occurs in various compounds and substances used in the automobile.</p> <p>10.1.3 Explain the role an additive or catalyst plays in the mixing of fillers or finishes for use on the automobile body.</p> <p>10.1.4 Describe and explain the role that pigmentation plays in determining the specific shade of an automobile body or interior component color.</p> <p>10.1.5 Explain how various forms of energy are dissipated throughout the body based on the momentum of the vehicle at the time of impact.</p> <p>10.1.6 Explain the principles of force as it applies to the</p>

	<p>realignment of components.</p> <p>10.1.7 Demonstrate an understanding of the role of balanced and unbalanced forces on linear or rotating vehicle assemblies.</p> <p>10.1.8 Explain how the velocity of an object in motion impacts on another object.</p> <p>10.1.9 Explain how the rate of a force in motion can impact on an automobile body.</p> <p>10.1.10 Demonstrate an understanding of the concept of pressure in relation to the concept of using force to realign a component.</p> <p>10.1.11 Explain the concept of heat transfer in terms of conduction, convection, and radiation in various automotive systems.</p> <p>10.1.12 Explain the role of insulation in maintaining stable temperatures or preventing the transfer of heat to an unwanted area.</p> <p>10.1.13 Explain how the angle or amount of light can impact on the appearance of a given finish in terms of texture and quality of finish.</p> <p>10.1.14 Explain how ultraviolet rays can cause a finish or substance to deteriorate.</p> <p>10.1.15 Explain and demonstrate an understanding of how sound generated in one place in the body and engine can be carried to other parts of the engine through metal and other materials.</p> <p>10.1.16 Explain the need for sound deadening and vibration damping materials to control the level of sound in the passenger compartment.</p> <p>10.1.17 Explain and demonstrate an understanding of the role of listening to sounds as part of the trouble-shooting process.</p> <p>10.1.18 Explain how levers and pulleys can be used to increase an applied force or distance.</p> <p>10.1.19 Identify the characteristics that define a component or system that is operating within the manufacturer's specifications.</p> <p>10.1.20 Use tension gauges, such as a torque wrench, to measure the force or tension required to tighten connections to the manufacturer's specifications.</p> <p>10.1.21 Use pressure measuring tools to determine pressures in hydraulic or pneumatic paint systems and compare to the manufacturer's specifications.</p> <p>10.1.22 Use direct methods to measure application times and compare the results to the manufacturer's specifications.</p>
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	<p>10.1.23 Use direct methods to measure the volume of liquids in a mixture or compound.</p> <p>10.1.24 Explain how an applied force at one location can be transmitted via fluid pressure to provide a force at a remote location.</p> <p>10.1.25 Explain to the customer the need for lubrication of adjacent parts to minimize friction as a result of movement at the junction of the parts.</p> <p>10.1.26 Explain the criticality of metals with different hardness, depending on the function and location of the metal as well as how fillers and finishes adhere to metal.</p> <p>10.1.27 Explain the necessity of knowing that the hardness of a metal determines, in part, its function and location in the automobile.</p> <p>10.1.28 Demonstrate an understanding of how cams, pulleys, and levers are used to multiply force or transfer directions of force.</p> <p>10.1.29 Explain how rotational motion is changed to linear motion and the need for balance in rotating systems.</p> <p>10.1.30 Demonstrate an understanding of how variances in flow rate will affect operation of pneumatic tools and equipment.</p> <p>10.1.31 Explain the dynamic control properties of a hydraulic system in terms of its impact on spray patterns, volume, etc.</p> <p>10.1.32 Demonstrate an understanding of how a contaminated liquid can cause a chemical reaction, which can result in the deterioration of the finish or a plastic component.</p> <p>10.1.33 Use precision gauges or instruments to measure the flow rate of air in a painting application.</p> <p>10.1.34 Demonstrate an understanding of how variances in flow rate can affect the spray patterns, thickness of coat, etc., in the finishing process.</p> <p>10.1.35 Correctly use proportions and ratios in mixing fillers, finishes, and other substances.</p> <p>10.1.36 Explain the role that acids and bases have in altering compounds used on or in the automobile.</p> <p>10.1.37 Demonstrate an understanding of how surface processes and cohesive/adhesive forces aid in glues, tapes, and sealants.</p> <p>10.1.38 Identify the physical properties of an automobile component or system that are made of glass or plastic.</p> <p>10.1.39 Describe or explain the role that activators have in causing a change in the chemical state of a compound or filler.</p> <p>10.1.40 Explain fluid viscosity as a measurement and why it is</p>
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	<p>important to the application of fillers, plastics, and finishes.</p> <p>10.1.41 Locate and explain the properties of a given source of light.</p> <p>10.1.42 Demonstrate an understanding of the processes used to locate a short circuit in the electrical/electronic system.</p> <p>10.1.43 Explain the effect of oxidation on electrical connections as well as on an automotive finish.</p>
<p>APPROACHES STANDARD</p>	<ul style="list-style-type: none"> • Understand the use and safety requirements of all solvents used in an automotive application.

CROSSWALK OF COLLISION REPAIR STANDARDS AND ACADEMIC STANDARDS

The crosswalk of the Collision Repair Standards and Math, Science and English Standards shows by performance indicator where the learning activities in the Collision Repair program support academic learning. The performance indicators from the Collision Repair standards are grouped according to the performance standard they support; each performance indicator supports one or more of the academic standards in each corresponding cell.

MATH STANDARDS

Performance Indicators	Academic Standards
2.1.1, 2.1.9	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
2.1.1, 2.1.9	3.12.5 (Math) Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes in order to solve problems.
2.2.2, 2.2.3	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
2.2.2, 2.2.3	3.12.5 (Math) Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes in order to solve problems.
2.4.2, 2.4.3, 2.4.9	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
2.4.4	3.12.5 (Math) Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes in order to solve problems.
3.3.3	2.12.3 (Math) Create and use different forms of a variety of equations, proportions, and/or formulas, solving for the needed variable as necessary in given situations.
3.3.5, 3.5.2, 3.5.6, 3.5.9	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
3.5.3	3.12.5 (Math) Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes in order to solve problems.
4.2.13	3.12.5 (Math) Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes in order to solve problems.
4.1.9, 4.1.18	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
4.2.1, 4.2.17	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.

4.3.3	3.12.5 (Math) Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes in order to solve problems.
4.4.5, 4.4.10	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
4.4.8, 4.4.9	3.12.5 (Math) Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes in order to solve problems.
4.5.6	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
4.6.1	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
4.8.9	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
5.2.3, 5.2.4, 5.2.5	2.12.3 (Math) Create and use different forms of a variety of equations, proportions, and/or formulas, solving for the needed variable as necessary in given situations.
5.3.1, 5.3.2	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
5.3.1, 5.3.2	3.12.5 (Math) Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes in order to solve problems.
5.4.2	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
5.4.8, 5.4.10	2.12.3 (Math) Create and use different forms of a variety of equations, proportions, and/or formulas, solving for the needed variable as necessary in given situations.
5.4.8, 5.4.10	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
5.4.8, 5.4.10	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
6.3.6	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.
6.5.2, 6.5.3	3.12.2 (Math) Select and use measurement tools, techniques, and formulas to calculate and compare rates, costs, distances, interest, temperatures, and weight/mass.

SCIENCE STANDARDS

Performance Indicators	Academic Standards
1.1.1, 1.1.14	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6, 2.1.7	P.12.B.1 (Science) Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S
2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6, 2.1.7	P.12.C.2 (Science) Students know energy forms can be converted. E/S
2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6, 2.1.7	P.12.C.5 (Science) Students know the relationship between heat and temperature . I/S
2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6, 2.1.7	E.12.A.4 (Science) Students know convection and radiation play important roles in moving heat energy in the Earth system. E/S
2.1.8	P.12.B.1 (Science) Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S
2.2.1	P.12.B.1 (Science) Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S
2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10	P.12.B.1 (Science) Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S
2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10	P.12.B.1 (Science) Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S
2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10	P.12.C.2 (Science) Students know energy forms can be converted. E/S
2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10	P.12.C.5 (Science) Students know the relationship between heat and temperature . I/S
2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10	E.12.A.4 (Science) Students know convection and radiation play important roles in moving heat energy in the Earth system. E/S
2.4.3, 2.4.6	P.12.C.2 (Science) Students know energy forms can be converted. E/S
2.4.3, 2.4.6	P.12.C.5 (Science) Students know the relationship between heat and temperature . I/S
2.4.7	P.12.B.1 (Science) Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S
2.4.7, 2.4.9	P.12.A.1 (Science) Students know different molecular arrangements and motions account for the different physical properties of solids, liquids, and gases. E/S
2.4.10	P.12.A.5 (Science) Students know chemical reactions can take place at different rates, depending on a variety of factors (i.e. temperature, concentration, surface area, and agitation). E/S
2.4.10	P.12.A.6 (Science) Students know chemical reactions either release or absorb energy. E/S

2.4.10	P.12.C.2 (Science) Students know energy forms can be converted. E/S
2.4.10	P.12.C.5 (Science) Students know the relationship between heat and temperature . I/S
3.1.7	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
3.2.1	P.12.C.2 (Science) Students know energy forms can be converted. E/S
3.2.1	P.12.C.5 (Science) Students know the relationship between heat and temperature . I/S
3.2.8	P.12.A.1 (Science) Students know different molecular arrangements and motions account for the different physical properties of solids, liquids, and gases. E/S
3.3.2, 3.3.3, 3.3.4	P.12.B.1 (Science) Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S
3.4.2	P.12.A.1 (Science) Students know different molecular arrangements and motions account for the different physical properties of solids, liquids, and gases. E/S
3.5.2, 3.5.3, 3.5.5, 3.5.6, 3.5.8	P.12.C.2 (Science) Students know energy forms can be converted. E/S
3.5.2, 3.5.3, 3.5.5, 3.5.6, 3.5.8	P.12.C.5 (Science) Students know the relationship between heat and temperature . I/S
3.5.7	P.12.B.1 (Science) Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S
4.1.11, 4.1.14	P.12.B.1 (Science) Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S
4.1.15, 4.1.16, 4.1.17, 4.1.18	P.12.B.1 (Science) Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S
4.1.9, 4.1.10, 4.1.11, 4.1.12, 4.1.13, 4.1.14, 4.1.15, 4.1.16, 4.1.17, 4.1.18	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
4.2.6, 4.2.9, 4.2.10, 4.2.11	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
4.2.15	P.12.A.1 (Science) Students know different molecular arrangements and motions account for the different physical properties of solids, liquids, and gases. E/S
4.3.1, 4.3.2, 4.3.3, 4.3.4, 4.3.5, 4.3.7	P.12.A.1 (Science) Students know different molecular arrangements and motions account for the different physical properties of solids, liquids, and gases. E/S
4.4.1, 4.4.2	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L

4.4.4	P.12.A.1 (Science) Students know different molecular arrangements and motions account for the different physical properties of solids, liquids, and gases. E/S
4.4.5, 4.4.6, 4.4.7, 4.4.8, 4.4.11, 4.4.12, 4.4.13	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
4.4.9	P.12.B.1 (Science) Students know laws of motion can be used to determine the effects of forces on the motion of objects. E/S
4.5.2, 4.5.3	P.12.A.1 (Science) Students know different molecular arrangements and motions account for the different physical properties of solids, liquids, and gases. E/S
4.5.4, 4.5.6	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
4.6.1, 4.6.2, 4.6.3	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
4.7.1, 4.7.3	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
4.8.6	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
4.8.8	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
5.1.1, 5.1.2, 5.1.3, 5.1.4	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
5.2.5	P.12.A.3 (Science) Students know identifiable properties can be used to separate mixtures.
5.2.6, 5.2.10, 5.2.12	P.12.A.1 (Science) Students know different molecular arrangements and motions account for the different physical properties of solids, liquids, and gases. E/S
5.3.2	P.12.A.1 (Science) Students know different molecular arrangements and motions account for the different physical properties of solids, liquids, and gases. E/S
5.3.2	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
5.4.1, 5.4.2, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.4.8	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
5.5.1, 5.5.2, 5.5.3, 5.5.4, 5.5.5, 5.5.6, 5.5.7, 5.5.8	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L

5.6.1	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
7.1.2	N.12.A.2 (Science) Students know scientists maintain a permanent record of procedures, data, analyses, decisions, and understandings of scientific investigations. I/S
7.1.2	N.12.A.3 (Science) Students know repeated experimentation allows for statistical analysis and unbiased conclusions. E/S
7.2.3, 7.2.5	N.12.B.3 (Science) Students know the influence of ethics on scientific enterprise. E/S
7.3.1	N.12.A.3 (Science) Students know repeated experimentation allows for statistical analysis and unbiased conclusions. E/S
7.4.4	N.12.A.2 (Science) Students know scientists maintain a permanent record of procedures, data, analyses, decisions, and understandings of scientific investigations. I/S
7.4.5	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
7.6.1	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
7.6.1, 7.6.2	N.12.B.3 (Science) Students know the influence of ethics on scientific enterprise. E/S
7.6.5	N.12.A.4 (Science) Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. E/L
7.7.8	N.12.A.1 (Science) Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations. E/S

ENGLISH STANDARDS

Performance Indicators	Academic Standards
3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 3.1.7	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.2.5, 3.2.6, 3.2.7, 3.2.8	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
3.3.1, 3.3.2, 3.3.4	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
3.4.1, 3.4.2	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
3.5.8	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
3.5.8	6.12.1 (English) Generate ideas for writing by selecting appropriate prewriting strategies with attention to audience, purpose, and personal style.
3.6.1, 3.6.2	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
4.1.2, 4.1.3, 4.1.4, 4.1.5, 4.1.6, 4.1.7	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
4.2.2, 4.2.3, 4.2.4, 4.2.5, 4.2.6, 4.2.7, 4.2.8, 4.2.9, 4.2.10, 4.2.13, 4.2.14	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
4.3.2, 4.3.3, 4.3.5, 4.3.6	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.4.6, 4.4.7, 4.4.8, 4.4.9, 4.4.10, 4.4.11, 4.4.12	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
4.5.1, 4.5.2, 4.5.3, 4.5.4	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
4.6.1, 4.6.2, 4.6.3	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
4.7.1, 4.7.2, 4.7.3	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
4.8.1, 4.8.2, 4.8.3, 4.8.4, 4.8.5, 4.8.6, 4.8.7, 4.8.8	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
5.1.1, 5.1.2, 5.1.3, 5.1.4	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.

5.2.1, 5.2.2, 5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.7, 5.2.8, 5.2.9, 5.2.10, 5.2.11, 5.2.12, 5.2.13	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
5.3.1, 5.3.2	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
5.4.1, 5.4.2, 5.4.3, 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.4.8, 5.4.9, 5.4.10	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
5.5.1, 5.5.2, 5.5.3, 5.5.4, 5.5.6, 5.5.7, 5.5.8, 5.5.9, 5.5.10, 5.5.11, 5.5.12, 5.5.13, 5.5.14, 5.5.15, 5.5.16, 5.5.17, 5.5.18, 5.5.19, 5.5.20, 5.5.21, 5.5.22, 5.5.23, 5.5.24, 5.5.25, 5.5.26, 5.5.27, 5.5.28	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
5.6.1	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
6.1.1, 6.1.2	9.12.2 (English) Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose.
6.2.1, 6.2.2, 6.2.3, 6.2.4	9.12.2 (English) Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose.
6.3.1, 6.3.2, 6.3.3, 6.3.4, 6.3.5	9.12.2 (English) Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose.
6.4.1, 6.4.2, 6.4.3, 6.4.4	9.12.2 (English) Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose.
6.5.1, 6.5.3	6.12.3 (English) Write compositions that present complex ideas in a sustained and compelling manner.
7.1.1	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
7.1.2, 7.1.3	9.12.2 (English) Make formal oral or multimedia presentations using vocabulary and public speaking techniques appropriate to audience and purpose.
7.1.4, 7.1.5	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
7.2.1	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
7.2.3, 7.2.4	9.12.2 (English) Make formal oral or multimedia presentations using vocabulary and public speaking techniques appropriate to audience and purpose.
7.3.1	7.12.2 (English) Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effects.

7.3.2	9.12.2 (English) Make formal oral or multimedia presentations using vocabulary and public speaking techniques appropriate to audience and purpose.
7.3.5, 7.3.6, 7.3.7	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
7.4.1, 7.4.2, 7.4.3, 7.4.4, 7.4.5	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
7.5.1, 7.5.2, 7.5.3, 7.5.4, 7.5.5, 7.5.6	9.12.2 (English) Make formal oral or multimedia presentations using vocabulary and public speaking techniques appropriate to audience and purpose.
7.6.2	9.12.2 (English) Make formal oral or multimedia presentations using vocabulary and public speaking techniques appropriate to audience and purpose.
7.6.6, 7.6.7	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
7.7.1, 7.7.2, 7.7.3, 7.7.7, 7.7.8	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
7.8.1, 7.8.2	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
7.8.4	9.12.2 (English) Make formal oral or multimedia presentations using vocabulary and public speaking techniques appropriate to audience and purpose.
7.8.5, 7.8.6	6.12.3 (English) Write compositions that present complex ideas in a sustained and compelling manner.
7.8.8, 7.8.9	9.12.2 (English) Make formal oral or multimedia presentations using vocabulary and public speaking techniques appropriate to audience and purpose.
7.8.10	6.12.1 (English) Generate ideas for writing by selecting appropriate prewriting strategies with attention to audience, purpose, and personal style.
7.9.1	6.12.3 (English) Write compositions that present complex ideas in a sustained and compelling manner.
8.1.1, 8.1.6	4.12.6 (English) Read and apply multi-step directions in order to perform complex procedures and tasks.
8.1.2	9.12.2 (English) Make formal oral or multimedia presentations using vocabulary and public speaking techniques appropriate to audience and purpose.
8.1.5	6.12.3 (English) Write compositions that present complex ideas in a sustained and compelling manner.