

North Dakota Automotive Technology Education

Content Standards

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North Dakota Department of Career and Technical Education

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North Dakota Technical Education Standards Process

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Career and Technical Education Standards Introduction

Mission

The mission of the State Board for Career and Technical Education (CTE) is to work with others to provide all North Dakota citizens with the technical skills, knowledge, and attitudes necessary for successful performance in a globally competitive workplace.

Vision

The State Board for Career and Technical Education (CTE) is committed to providing career awareness, work readiness skills, occupational preparation, and retraining of workers throughout the state. Career and technical education will span all educational levels, providing youth with exploration opportunities and the foundation skills needed to enter the world of work while providing adults with skills needed to enter, re-enter, or advance in the workforce.

Goal

North Dakota Career and Technical Education's goal is to create a competitive and knowledgeable work force. This is accomplished through a variety of educational program areas that are organized to prepare students for careers in their chosen fields, to take leadership roles, and balance their multiple roles in life. CTE programs prepare students with the knowledge and skills to make informed career choices, to integrate and apply academic concepts, to prepare for successful participation in a global society, and to engage in lifelong learning.

Standards Development Process

Standards development is a multi-phase process. Existing and/or industry standards are the basis for the North Dakota Program Standards. A team of expert secondary and postsecondary teachers, business and industry representatives, and the state program supervisor draft the standards document. Once the document is finalized, the State Board for Career and Technical Education approves and adopts the standards.

Course Frameworks are also developed by the writing team. A framework includes a brief overview of the course content, topical units of study, and identifies the standards recommended for inclusion within the course. The frameworks are tailored to prepare young people for the opportunities in North Dakota. School Districts will use the frameworks as a guide for developing curriculum that reflects local needs.

Key Principles of Career and Technical Education

We believe that Career Technical Education:

1. Draws its curricula, standards, and organizing principles from the workplace.

The workplace provides the context, objectives, and organizing constructs for instruction and assessment. The workplace also defines the standards of performance necessary, including those required for academic, technical, and employability skills.

2. Is a critical and integral component of the total educational system, offering career-oriented benefits for all students.

CTE classes offer educational benefits to students pursuing careers requiring specific technical skills as well as providing a strong foundation for those pursuing a traditional four-year (or more) degree.

3. Is a critical and integral component of the workforce development system, providing the essential foundation for a thriving economy.

Preparation of a well-prepared, qualified workforce requires solid academics, good work ethics, and specific technical skills as well as the ability to communicate, work with others, solve problems, and use information. CTE contributes directly to this preparation by providing a curriculum tied to specific workplace requirements.

4. Maintains high levels of excellence supported through identification of academic and workplace standards, measurement of performance (accountability), and high expectations for participant success.

Career Technical Education is committed to continuous improvement, attention to industry certification, and the development of highly qualified teachers.

5. Is robust and flexible enough to respond to the needs of the multiple educational environments, customers, and levels of specialization.

CTE involves a large and complex delivery system that (1) integrates career exploration, (2) provides effective tools for organizing all curricula, (3) facilitates the teaching and use of technology, (4) is integrated into the total learning experience, (5) enhances the learning of academic subjects, (6) teaches broad occupational skills, (7) includes all aspects of the industry, (8) teaches how to balance family and work responsibilities, (9) provides job-specific training, (10) is offered at multiple levels of the educational continuum, and (11) is delivered through a variety of educational environments.

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| Standard 1 | <i>AUTO SHOP ORIENTATION</i> | |
| Topic 1.1 | Shop and Personal Safety | |
| | Student Competencies | |
| | 1.1.1 | Identify general shop safety rules and procedures. |
| | 1.1.2 | Utilize safe procedures for handling of tools and equipment. |
| | 1.1.3 | Identify and use proper placement of floor jacks and jack stands. |
| | 1.1.4 | Identify and use proper procedures for safe lift operation. |
| | 1.1.5 | Utilize proper ventilation procedures for working within the lab/shop area. |
| | 1.1.6 | Identify marked safety areas. |
| | 1.1.7 | Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. |
| | 1.1.8 | Identify the location and use of eye wash stations. |
| | 1.1.9 | Identify the location of the posted evacuation routes. |
| | 1.1.10 | Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities. |
| | 1.1.11 | Identify and wear appropriate clothing for lab/shop activities. |
| | 1.1.12 | Secure hair and jewelry for lab/shop activities. |
| | 1.1.13 | Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. |
| | 1.1.14 | Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.). |
| | 1.1.15 | Locate and demonstrate knowledge of material safety data sheets (MSDS). |
| Topic 1.2 | Tools and Equipment | |
| | Student Competencies | |
| | 1.2.1 | Identify tools and their usage in automotive applications. |
| | 1.2.2 | Identify standard and metric designation. |
| | 1.2.3 | Demonstrate safe handling and use of appropriate tools. |
| | 1.2.4 | Demonstrate proper cleaning, storage, and maintenance of tools and equipment. |
| | 1.2.5 | Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper). |
| Topic 1.3 | Preparing Vehicle for Service | |
| | Student Competencies | |
| | 1.3.1 | Identify information needed and the service requested on a repair order. |
| | 1.3.2 | Identify purpose and demonstrate proper use of fender covers, mats. |
| | 1.3.3 | Demonstrate use of the three C's (concern, cause, and correction). |
| | 1.3.4 | Review vehicle service history. |

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| | 1.3.5 | Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. |
| Topic 1.4 | Preparing Vehicle for Customer | |
| Student Competencies | | |
| | 1.4.1 | Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.). |

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| Standard 2 | <i>ENGINE REPAIR</i> | |
| Topic 2.1 | General | |
| | Student Competencies | |
| | 2.1.1 | Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. |
| | 2.1.2 | Verify operation of the instrument panel engine warning indicators. |
| | 2.1.3 | Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. |
| | 2.1.4 | Install engine covers using gaskets, seals, and sealers as required. |
| | 2.1.5 | Remove and replace timing belt; verify correct camshaft timing. |
| | 2.1.6 | Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert. |
| | 2.1.7 | Identify service precautions related to service of the internal combustion engine of a hybrid vehicle. |
| Topic 2.2 | Cylinder Head and Valve Train | |
| | Student Competencies | |
| | 2.2.1 | Adjust valves (mechanical or hydraulic lifters). |
| | 2.2.2 | Identify components of the cylinder head and valve train. |
| Topic 2.3 | Lubrication and Cooling Systems | |
| | Student Competencies | |
| | 2.3.1 | Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine necessary action. |
| | 2.3.2 | Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. |
| | 2.3.3 | Remove, inspect, and replace thermostat and gasket/seal. |
| | 2.3.4 | Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. |
| | 2.3.5 | Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required. |
| | 2.3.6 | Identify components of the lubrication and cooling systems. |

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| Standard 3 | <i>AUTOMATIC TRANSMISSION AND TRANSAXLE</i> | |
| Topic 3.1 | General | |
| | Student Competencies | |
| | 3.1.1 | Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. |
| | 3.1.2 | Check fluid level in a transmission or a transaxle equipped with a dip-stick. |
| | 3.1.3 | Check fluid level in a transmission or a transaxle not equipped with a dip-stick. |
| | 3.1.4 | Check transmission fluid condition; check for leaks. |
| | 3.1.5 | Identify drive train components and configuration. |
| Topic 3.2 | In-Vehicle Transmission/Transaxle | |
| | Student Competencies | |
| | 3.2.1 | Inspect, adjust, and/or replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch. |
| | 3.2.2 | Inspect for leakage at external seals, gaskets, and bushings. |
| | 3.2.3 | Inspect replace and/or align power train mounts. |
| | 3.2.4 | Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification. |
| Topic 3.3 | Off-Vehicle Transmission and Transaxle | |
| | Student Competencies | |
| | 3.3.1 | Describe the operational characteristics of a continuously variable transmission (CVT). |
| | 3.3.2 | Describe the operational characteristics of a hybrid vehicle drive train. |

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| Standard 4 | <i>MANUAL DRIVE TRAIN AND AXLES</i> | |
| Topic 4.1 | General | |
| | Student Competencies | |
| | 4.1.1 | Research vehicle service information including fluid type, fluid type, vehicle service history, service precautions, and technical service bulletins. |
| | 4.1.2 | Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specifications. |
| | 4.1.3 | Check fluid condition; check for leaks. |
| | 4.1.4 | Identify manual drive train and axle components and configuration. |
| Topic 4.2 | Clutch | |
| | Student Competencies | |
| | 4.2.1 | Check and adjust clutch master cylinder fluid level; use proper fluid type per manufacturer specification. |
| | 4.2.2 | Check for hydraulic system leaks. |
| Topic 4.3 | Transmission/Transaxle | |
| | Student Competencies | |
| | 4.3.1 | Describe the operational characteristics of an electronically-controlled manual transmission/transaxle. |
| Topic 4.4 | Drive Shaft, Half Shafts, Universal and Constant-Velocity (CV) Joints | |
| | Student Competencies | |
| | 4.4.1 | Inspect, remove, and/or replace front wheel drive (FWD) bearings, hubs, and seals. |
| | 4.4.2 | Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints. |
| | 4.4.3 | Inspect locking hubs. |
| | 4.4.4 | Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification. |
| Topic 4.5 | Differential Case Assembly | |
| | Student Competencies | |
| | 4.5.1 | Clean and inspect differential case; check for leaks; inspect housing vent. |
| | 4.5.2 | Check and adjust differential case fluid level; use proper fluid type per manufacturer specification. |
| | 4.5.3 | Drain and refill differential housing. |
| | 4.5.4 | Inspect and replace drive axle wheel studs. |

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| Standard 5 | <i>SUSPENSION AND STEERING</i> | |
| Topic 5.1 | General | |
| | Student Competencies | |
| | 5.1.1 | Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. |
| | 5.1.2 | Disable and enable supplemental restraint system (SRS); verify indicator lamp operation. |
| | 5.1.3 | Identify suspension and steering system components and configurations. |
| Topic 5.2 | Related Suspension and Steering Service | |
| | Student Competencies | |
| | 5.2.1 | Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. |
| | 5.2.2 | Inspect power steering fluid level and condition. |
| | 5.2.3 | Flush, fill, and bleed power steering system. |
| | 5.2.4 | Inspect for power steering fluid leakage. |
| | 5.2.5 | Remove, inspect, replace, and/or adjust power steering pump drive belt. |
| | 5.2.6 | Inspect and replace power steering hoses and fittings. |
| | 5.2.7 | Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. |
| | 5.2.8 | Inspect tie rod ends (sockets), tie rod sleeves, and clamps. |
| | 5.2.9 | Inspect upper and lower control arms, bushings, and shafts. |
| | 5.2.10 | Inspect and replace rebound and/or jounce bumpers. |
| | 5.2.11 | Inspect track bar, strut rods/radius arms, and related mounts and bushings. |
| | 5.2.12 | Inspect upper and lower ball joints (with or without wear indicators). |
| | 5.2.13 | Inspect suspension system coil springs and spring insulators (silencers). |
| | 5.2.14 | Inspect suspension system torsion bars and mounts. |
| | 5.2.15 | Inspect and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links. |
| | 5.2.16 | Inspect, remove, and/or replace strut cartridge or assembly; inspect mounts and bushings. |
| | 5.2.17 | Inspect front strut bearing and mount. |
| | 5.2.18 | Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms. |
| | 5.2.19 | Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts. |
| | 5.2.20 | Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings. |
| | 5.2.21 | Inspect electric power-steering assist system. |
| | 5.2.22 | Identify hybrid vehicle power steering system electrical circuits and safety precautions. |
| | 5.2.23 | Describe the function of steering and suspension control systems and components (i.e., active suspension and stability control). |

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| Topic 5.3 | Wheel Alignment | |
| | Student Competencies | |
| | 5.3.1 | Perform pre-alignment inspection; measure vehicle ride height. |
| | 5.3.2 | Describe alignments angles (camber, caster, and toe). |
| Topic 5.4 | Wheels and Tires | |
| | Student Competencies | |
| | 5.4.1 | Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label. |
| | 5.4.2 | Rotate tires according to manufacturer's recommendations including vehicles equipped with tire pressure monitoring systems (TPMS). |
| | 5.4.3 | Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic). |
| | 5.4.4 | Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor. |
| | 5.4.5 | Inspect tire and wheel assembly for air loss; perform necessary action; determine necessary action. |
| | 5.4.6 | Repair tire following vehicle manufacturer approved procedure. |
| | 5.4.7 | Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate system; verify operation of instrument panel lamps. |
| | 5.4.8 | Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS), including relearn procedure. |

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| Standard 6 | <i>BRAKES</i> | |
| Topic 6.1 | General | |
| | Student Competencies | |
| | 6.1.1 | Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. |
| | 6.1.2 | Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). |
| | 6.1.3 | Install wheel and torque lug nuts. |
| | 6.1.4 | Identify brake system components and configuration. |
| Topic 6.2 | Hydraulic System | |
| | Student Competencies | |
| | 6.2.1 | Describe proper brake pedal height, travel, and feel. |
| | 6.2.2 | Check master cylinder for external leaks and proper operation. |
| | 6.2.3 | Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports. |
| | 6.2.4 | Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification. |
| | 6.2.5 | Identify components of hydraulic brake warning light system. |
| | 6.2.6 | Bleed and/or flush brake system. |
| | 6.2.7 | Test brake fluid for contamination. |
| Topic 6.3 | Drum Brakes | |
| | Student Competencies | |
| | 6.3.1 | Remove, clean, and inspect brake drum diameter; measure brake drum diameter; determine serviceability. |
| | 6.3.2 | Refinish brake drum and measure final drum diameter; compare with specifications. |
| | 6.3.3 | Remove, clean, and/or inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. |
| | 6.3.4 | Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. |
| | 6.3.5 | Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments. |
| Topic 6.4 | Disc Brakes | |
| | Student Competencies | |
| | 6.4.1 | Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action. |
| | 6.4.2 | Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action. |

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| | 6.4.3 | Remove, inspect, and/or replace brake pads and retaining hardware; determine necessary action. |
| | 6.4.4 | Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads and inspect for leaks. |
| | 6.4.5 | Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout; determine necessary action. |
| | 6.4.6 | Remove and reinstall/replace rotor. |
| | 6.4.7 | Refinish rotor on vehicle; measure final rotor thickness and compare with specifications. |
| | 6.4.8 | Refinish rotor off vehicle; measure final rotor thickness and compare with specifications. |
| | 6.4.9 | Retract and re-adjust caliper piston on an integral parking brake system. |
| | 6.4.10 | Check brake pad wear indicator; determine necessary action. |
| | 6.4.11 | Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations. |
| Topic 6.5 | Power Assist Units | |
| | Student Competencies | |
| | 6.5.1 | Check brake pedal travel with, and without, engine running to verify proper power booster operation. |
| | 6.5.2 | Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. |
| Topic 6.6 | Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.) | |
| | Student Competencies | |
| | 6.6.1 | Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings. |
| | 6.6.2 | Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed. |
| | 6.6.3 | Check parking brake operation and parking brake indicator light system operation; determine necessary action. |
| | 6.6.4 | Check operation of brake stop light system. |
| | 6.6.5 | Replace wheel bearing and race. |
| | 6.6.6 | Inspect and replace wheel studs. |
| Topic 6.7 | Electronic Brakes, and Traction and Stability Control Systems | |
| | Student Competencies | |
| | 6.7.1 | Identify traction control/vehicle stability control system components. |
| | 6.7.2 | Describe the operation of a regenerative braking system. |

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| Standard 7 | <i>ELECTRICAL/ELECTRONIC SYSTEMS</i> | |
| Topic 7.1 | General | |
| Student Competencies | | |
| | 7.1.1 | Research vehicle service information including vehicle service history, service precautions, and technical service bulletins. |
| | 7.1.2 | Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law). |
| | 7.1.3 | Use wiring diagrams to trace electrical/electronic circuits. |
| | 7.1.4 | Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance. |
| | 7.1.5 | Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. |
| | 7.1.6 | Use a test light to check operation of electrical circuits. |
| | 7.1.7 | Use fused jumper wires to check operation of electrical circuits. |
| | 7.1.8 | Measure key-off battery drain (parasitic draw). |
| | 7.1.9 | Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. |
| | 7.1.10 | Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair) |
| | 7.1.11 | Identify electrical/electronic system components and configuration. |
| Topic 7.2 | Battery Service | |
| Student Competencies | | |
| | 7.2.1 | Perform battery state-of-charge test; determine necessary action. |
| | 7.2.2 | Confirm proper battery capacity for vehicle application; perform battery capacity and load test; determine necessary action. |
| | 7.2.3 | Maintain or restore electronic memory functions. |
| | 7.2.4 | Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs. |
| | 7.2.5 | Perform slow/fast battery charge according to manufacturer's recommendations. |
| | 7.2.6 | Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply. |
| | 7.2.7 | Identify safety precautions for high-voltage systems on electric, hybrid electric, and diesel vehicles. |
| | 7.2.8 | Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery. |
| | 7.2.9 | Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures. |

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| Topic 7.3 | Starting System | |
| | Student Competencies | |
| | 7.3.1 | Perform starter current draw test; determine necessary action. |
| | 7.3.2 | Perform starter circuit voltage drop tests; determine necessary action. |
| | 7.3.3 | Inspect and test starter relays and solenoids; determine necessary action. |
| | 7.3.4 | Remove and install starter in a vehicle. |
| | 7.3.5 | Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action. |
| | 7.3.6 | Demonstrate knowledge of an automatic idle-stop/start-stop system. |
| Topic 7.4 | Charging System | |
| | Student Competencies | |
| | 7.4.1 | Perform charging system output test; determine necessary action. |
| | 7.4.2 | Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment. |
| | 7.4.3 | Remove, inspect, and/or replace generator (alternator). |
| | 7.4.4 | Perform charging circuit voltage drop tests; determine necessary action. |
| Topic 7.5 | Lighting, Instrument Cluster, Driver Information, and Body Electrical Systems | |
| | Student Competencies | |
| | 7.5.1 | Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed. |
| | 7.5.2 | Aim headlights. |
| | 7.5.3 | Identify system voltage and safety precautions associated with high-intensity discharge headlights. |
| | 7.5.4 | Disable and enable supplemental restraint system (SRS); verify indicator lamp operation. |
| | 7.5.5 | Remove and reinstall door panel. |
| | 7.5.6 | Describe the operation of keyless entry/remote-start systems. |
| | 7.5.7 | Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators. |
| | 7.5.8 | Verify windshield wiper and washer operation; replace wiper blades. |

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| Standard 8 | <i>HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)</i> | |
| Topic 8.1 | General | |
| | Student Competencies | |
| | 1.1.1 | Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins. |
| | 1.1.2 | Identify heating, ventilation, and air conditioning (HVAC) components and configuration. |
| Topic 8.2 | Refrigeration System Components | |
| | Student Competencies | |
| | 1.2.1 | Inspect and replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine necessary action. |
| | 1.2.2 | Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions. |
| | 1.2.3 | Inspect A/C condenser for airflow restrictions; determine necessary action. |
| Topic 8.3 | Heating, Ventilation, and Engine Cooling Systems | |
| | Student Competencies | |
| | 1.3.1 | Inspect engine cooling and heater systems hoses and pipes; determine necessary action. |
| Topic 8.4 | Operating Systems and Related Controls | |
| | Student Competencies | |
| | 1.4.1 | Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; determine necessary action. |
| | 1.4.2 | Identify the source of A/C system odors. |

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| Standard 9 | <i>ENGINE PERFORMANCE</i> | |
| Topic 9.1 | General | |
| | Student Competencies | |
| | 1.1.1 | Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. |
| | 1.1.2 | Perform engine absolute manifold pressure tests (vacuum/boost); document results. |
| | 1.1.3 | Perform cylinder power balance test; document results. |
| | 1.1.4 | Perform cylinder cranking and running compression tests; document results. |
| | 1.1.5 | Perform cylinder leakage test; document results. |
| | 1.1.6 | Verify engine operating temperature. |
| | 1.1.7 | Remove and replace spark plugs; inspect secondary ignition components for wear and damage. |
| Topic 9.2 | Computerized Controls | |
| | Student Competencies | |
| | 1.2.1 | Retrieve and record diagnostic trouble codes (DTC), OBD monitor status, and freeze frame data; clear codes when applicable. |
| | 1.2.2 | Describe the use of the OBD monitors for repair verification. |
| Topic 9.3 | Fuel, Air Induction, and Exhaust Systems | |
| | Student Competencies | |
| | 1.3.1 | Replace fuel filter(s) where applicable. |
| | 1.3.2 | Inspect, service, or replace air filters, filter housings, and intake duct work. |
| | 1.3.3 | Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action. |
| | 1.3.4 | Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action. |
| | 1.3.5 | Check and refill diesel exhaust fluid (DEF). |
| Topic 9.4 | Emissions Control Systems | |
| | Student Competencies | |
| | 1.4.1 | Inspect, test, and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action. |

Career Ready Practices

1. Act as a Responsible and Contributing Citizen and Employee

Career-ready individuals understand the obligations and responsibilities of being a member of a community and demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them, think about the near-term and long-term consequences of their actions, and seek to act in ways that contribute to the betterment of their teams, families, community, and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

2. Apply Appropriate Academic and Technical Skills

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications and make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

3. Attend to Personal Health and Financial Well-Being

Career-ready individuals understand the relationship between personal health, workplace performance, and personal well-being; they act on that understanding to regularly practice health diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

4. Communicate Clearly, Effectively, and with Reason

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice and organization and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

5. Consider the environmental, social, and economic impacts of decisions

Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organizations and the environment. They are aware of and utilize new technologies, understandings, procedures, materials and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and profitability of the organization.

6. Demonstrate creativity and innovation

Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

7. Employ valid and reliable research strategies

Career-ready individuals are discerning in accepting and using new information to make decisions, change practices, or inform strategies. They use a reliable research process to search for new information and evaluate the validity of sources when considering the use and adoption of external information or practices. They use an informed process to test new ideas, information, and practices in their workplace situation.

8. Utilize critical thinking to make sense of problems and persevere in solving them

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur, quickly take action to address the problem, thoughtfully investigate the root cause of the problem prior to introducing solutions, and carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

9. Model integrity, ethical leadership, and effective management

Career-ready individuals consistently act in ways that align to personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the direction and actions of a team or organization, and they apply insights into human behavior to change others' actions, attitudes, and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morale, and organizational culture.

10. Plan education and career path aligned to personal goals

Career-ready individuals take personal ownership of their own educational and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience, and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the educational and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

11. Use technology to enhance productivity

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring and using new technology, being proficient with ubiquitous technology applications. They understand the inherent risks, personal and organizational, of technology applications, and they take actions to prevent or mitigate these risks.

12. Work productively in teams while using cultural/global competence

Career-ready individuals positively contribute to every team whether formal or informal. They apply an awareness of cultural differences to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.