



Nebraska Career Pathways Project

SKILLED AND TECHNICAL SCIENCES

***Transportation, Distribution and Logistics Cluster
Technical Knowledge and Skills***

High School/College AUTOMOTIVE SERVICE Student Checklist

				STUDENT:	DATE:
2	1	N	CODE	N = Not Exposed to Performance Element, 1 = Progressing with Performance Element, 2 = Mastery of Performance Element	
				SAFETY	
2	1	N	CODE	Understand and practice automotive safety (TDLA.AS)	
			TDLA.AS.1	<i>Demonstrate personal safety</i>	
			TDLA.AS.2	<i>Demonstrate general shop safety.</i>	
			TDLA.AS.3	<i>Demonstrate tool and equipment safety.</i>	
			TDLA.AS.4	<i>Demonstrate gas, electrical and chemical safety.</i>	
			TDLA.AS.5	<i>Demonstrate knowledge of proper actions to be taken in an emergency.</i>	
				ENGINES	
2	1	N	CODE	Demonstrate ability to make general engine diagnosis; removal and reinstallation (TDLA.DRR)	
			TDLA.DRR.1	<i>Complete work order including customer information, vehicle identifying information, customer concern, related service history, cause, and correction.</i>	
			TDLA.DRR.2	<i>Identify and interpret engine concern; determine necessary action.</i>	
			TDLA.DRR.3	<i>Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins.</i>	
			TDLA.DRR.4	<i>Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals)</i>	
			TDLA.DRR.5	<i>Inspect engine assembly for fuel, oil, coolant and other leaks; determine necessary action.</i>	
			TDLA.DRR.6	<i>Diagnose engine noises and vibrations; determine necessary action.</i>	

			TDLA.DRR.7	<i>Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action.</i>
			TDLA.DRR.8	<i>Perform engine vacuum tests; determine necessary action.</i>
			TDLA.DRR.9	<i>Perform cylinder power balance tests; determine necessary action.</i>
			TDLA.DRR.10	<i>Perform cylinder cranking compression tests; determine necessary action.</i>
			TDLA.DRR.11	<i>Perform cylinder leakage tests; determine necessary action.</i>
			TDLA.DRR.12	<i>Remove and reinstall engine in a front-wheel or rear-wheel drive vehicle</i>
			TDLA.DRR.13	<i>Install engine covers using gaskets, seals and sealers as required.</i>
2	1	N	CODE	Demonstrate ability to make cylinder head and valve train diagnosis and repair (TDLA.CHVT)
			TDLA.CHVT.1	<i>Remove and reinstall cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures.</i>
			TDLA.CHVT.2	<i>Visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition.</i>
			TDLA.CHVT.3	<i>Inspect valve springs for squareness and free height comparison; determine necessary action.</i>
			TDLA.CHVT.4	<i>Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks and valve grooves; determine necessary action.</i>
			TDLA.CHVT.5	<i>Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action.</i>
			TDLA.CHVT.6	<i>Inspect valves and valve seats; determine necessary action</i>
			TDLA.CHVT.7	<i>Check valve face-to-seat contact and valve seat concentricity (runout); determine necessary action.</i>
			TDLA.CHVT.8	<i>Check valve spring assembled height and valve stem height; determine necessary action.</i>
			TDLA.CHVT.9	<i>Inspect pushrods, rocker arms, rocker arm pivots and shaft for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.</i>
			TDLA.CHVT.10	<i>Inspect hydraulic or mechanical lifters; determine necessary action.</i>
			TDLA.CHVT.11	<i>Adjust valves (mechanical or hydraulic lifters).</i>
			TDLA.CHVT.12	<i>Inspect camshaft drives (including gear wear and backlash, sprocket and chain wear); determine necessary action.</i>
			TDLA.CHVT.13	<i>Inspect and replace timing belts (chains); overhead camdrive sprockets and tensioners; check belt/chain tension; adjust as necessary.</i>
			TDLA.CHVT.14	<i>Inspect camshaft for runout, journal wear and lobe wear.</i>
			TDLA.CHVT.15	<i>Inspect camshaft bearing surface for wear, damage, out-of-round and alignment; determine necessary action.</i>
			TDLA.CHVT.16	<i>Establish camshaft(s) timing and cam sensor indexing according to manufacturer's specifications and procedures.</i>

2	1	N	CODE	Demonstrate ability in engine block assembly diagnosis and repair (TDLA.EBDR)
			TDLA.EBDR.1	<i>Disassemble engine block; clean and prepare components for inspection and reassembly.</i>
			TDLA.EBDR.2	<i>Inspect engine block for visible cracks, passage condition, core and gallery plug condition and surface warpage; determine necessary action.</i>
			TDLA.EBDR.3	<i>Perform common fastener and thread repair to include: remove broken bolt, restore internal and external threads and repair internal threads with thread insert.</i>
			TDLA.EBDR.4	<i>Inspect and measure cylinder walls/sleeves for damage, wear and ridges; determine necessary action.</i>
			TDLA.EBDR.5	<i>Deglaze and clean cylinder walls.</i>
			TDLA.EBDR.6	<i>Inspect and measure camshaft bearings for wear, damage, out-of-round and alignment; determine necessary action.</i>
			TDLA.EBDR.7	<i>Inspect crankshaft for end play, straightness, journal damage, keyway damage, thrust flange and surface condition and visual surface cracks; check oil passage condition; measure journal wear; check crankshaft sensor reluctor ring (where applicable); determine necessary action.</i>
			TDLA.EBDR.8	<i>Inspect main and connecting rod bearings for damage and wear; determine necessary action.</i>
			TDLA.EBDR.9	<i>Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine necessary action.</i>
			TDLA.EBDR.10	<i>Inspect and measure pistons; determine necessary action..</i>
			TDLA.EBDR.11	<i>Remove and replace piston pins.</i>
			TDLA.EBDR.12	<i>Inspect, measure and install piston rings.</i>
			TDLA.EBDR.13	<i>Inspect auxiliary (balance, intermediate, idler, counterbalance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time.</i>
			TDLA.EBDR.14	<i>Inspect or replace crankshaft vibration damper (harmonic balancer).</i>
			TDLA.EBDR.15	<i>Assemble engine block assembly.</i>
2	1	N	CODE	Demonstrate ability in lubrication and cooling systems diagnosis and repair (TDLA.LCDR)
			TDLA.LCDR.1	<i>Perform oil pressure tests; determine necessary action.</i>
			TDLA.LCDR.2	<i>Inspect oil pump gears or rotors, housing, pressure relief devices and pump drive; determine necessary action.</i>
			TDLA.LCDR.3	<i>Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank and hoses; determine necessary action.</i>
			TDLA.LCDR.4	<i>Inspect, replace and adjust drive belts, tensioners and pulleys; check pulley and belt alignment.</i>
			TDLA.LCDR.5	<i>Inspect and replace engine cooling and heater system hoses.</i>
			TDLA.LCDR.6	<i>Inspect, test and replace thermostat and gasket.</i>
			TDLA.LCDR.7	<i>Test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.</i>
			TDLA.LCDR.8	<i>Inspect, test, remove and replace water pump.</i>

			TDLA.LCDR.9	<i>Remove and replace radiator.</i>
			TDLA.LCDR.10	<i>Inspect and test fan(s) (electrical and mechanical), fan clutch, fan shroud and air dams.</i>
			TDLA.LCDR.11	<i>Inspect auxiliary oil coolers; determine necessary action.</i>
			TDLA.LCDR.12	<i>Inspect, test and replace oil temperature and pressure switches and sensors.</i>
			TDLA.LCDR.13	<i>Perform oil and filter change.</i>
				AUTOMATIC TRANSMISSION AND TRANSAXLE
2	1	N	CODE	Demonstrate ability in general transmission and transaxle diagnosis (TDLA.ATTD)
			TDLA.ATTD.1	<i>Complete work order including customer information, vehicle identifying information, customer concern, related service history, cause, and correction.</i>
			TDLA.ATTD.2	<i>Identify and interpret transmission/transaxle concern; assure proper engine operation; determine necessary action.</i>
			TDLA.ATTD.3	<i>Research applicable vehicle and service information, such as transmission/transaxle system operation, fluid type, vehicle service history, service precautions and technical service bulletins.</i>
			TDLA.ATTD.4	<i>Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals)</i>
			TDLA.ATTD.5	<i>Diagnose fluid loss and condition concerns: check fluid level on transmission with and without dipstick; determine necessary action.</i>
			TDLA.ATTD.6	<i>Perform pressure tests; determine necessary action.</i>
			TDLA.ATTD.7	<i>Perform stall test; determine necessary action.</i>
			TDLA.ATTD.8	<i>Perform lock-up converter system test; determine necessary action.</i>
			TDLA.ATTD.9	<i>Diagnose mechanical and vacuum control system concerns; determine necessary action..</i>
			TDLA.ATTD.10	<i>Diagnose noise and vibration concerns; determine necessary action.</i>
			TDLA.ATTD.11	<i>Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven and held member (power flow) principles.</i>
			TDLA.ATTD.12	<i>Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law).</i>
			TDLA.ATTD.13	<i>Diagnose electrical/electronic concerns using principles of electricity (Ohm's Law).</i>
2	1	N	CODE	Demonstrate ability in transmission and transaxle maintenance and adjustment (TDLA.TTMA)
			TDLA.TTMA.1	<i>Inspect, adjust or replace throttle valve (TV) linkages or cables; manual shift linkages or cables; transmission range sensor; check gear select indicator (as applicable)</i>
			TDLA.TTMA.2	<i>Service transmission; perform visual inspection; replace fluids and filters.</i>

2	1	N	CODE	Demonstrate ability in in-vehicle transmission and transaxle repair (TDLA.AIVR)
			TDLA.AIVR.1	<i>Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses.</i>
			TDLA.AIVR.2	<i>Inspect, repair and replace governor assembly.</i>
			TDLA.AIVR.3	<i>Inspect and replace external seals and gaskets.</i>
			TDLA.AIVR.4	<i>Inspect extension housing, bushings and seals; perform necessary action.</i>
			TDLA.AIVR.5	<i>Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS) and retainers.</i>
			TDLA.AIVR.6	<i>Diagnose electronic transmission control systems using a scan tool: determine necessary action.</i>
			TDLA.AIVR.7	<i>Inspect, replace and align powertrain mounts</i>
2	1	N	CODE	Demonstrate ability in off-vehicle transmission and transaxle repair (TDLA.AOVR)
				Removal, Disassembly and Reinstallation
			TDLA.AOVR.1	<i>Remove and reinstall transmission and torque converter (rear-wheel drive).</i>
			TDLA.AOVR.2	<i>Remove and reinstall transaxle and torque converter assembly.</i>
			TDLA.AOVR.3	<i>Disassemble, clean and inspect transmission/transaxle.</i>
			TDLA.AOVR.4	<i>Inspect, measure, clean and replace valve body (includes surfaces, bores, springs, valves, sleeves, retainers, brackets, check-balls, screens, spacers and gaskets).</i>
			TDLA.AOVR.5	<i>Inspect servo bore, piston, seals, pin, spring and retainer; determine necessary action.</i>
			TDLA.AOVR.6	<i>Inspect accumulator bore, piston, seals, spring and retainer; determine necessary action.</i>
			TDLA.AOVR.7	<i>Assemble transmission/transaxle.</i>
			TDLA.AOVR.8	<i>Inspect, leak test and flush cooler, lines and fittings.</i>
				Oil Pump and Converter
			TDLA.AOVR.9	<i>Inspect converter flex plate, attaching parts, pilot, pump drive and seal areas.</i>
			TDLA.AOVR.10	<i>Measure torque converter endplay and check for interference; check stator clutch.</i>
			TDLA.AOVR.11	<i>Inspect, measure and reseal oil pump assembly and components.</i>
				Gear Train, Shafts, Bushings and Case
			TDLA.AOVR.12	<i>Measure endplay or preload; determine necessary action.</i>
			TDLA.AOVR.13	<i>Inspect, measure and replace thrust washers and bearings.</i>
			TDLA.AOVR.14	<i>Inspect oil deliver seal rings, ring grooves and sealing surface areas.</i>
			TDLA.AOVR.15	<i>Inspect bushings; determine necessary action.</i>
			TDLA.AOVR.16	<i>Inspect and measure planetary gear assembly (includes sun, ring gear, thrust washers, planetary gears and carrier assembly); determine necessary action.</i>

			TDLA.AOVR.17	<i>Inspect case bores, passages, bushings, vents and mating surfaces; determine necessary action.</i>
			TDLA.AOVR.18	<i>Inspect transaxle drive, link chains, sprockets, gears, bearings and bushings; perform necessary action.</i>
			TDLA.AOVR.19	<i>Inspect, measure, repair or replace transaxle final drive components.</i>
			TDLA.AOVR.20	<i>Inspect and reinstall parking pawl, shaft, spring and retainer; determine necessary action.</i>
				Friction and Reaction Units
			TDLA.AOVR.21	<i>Inspect clutch drum, piston, check-balls, springs, retainers, seals and friction and pressure plates; determine necessary action.</i>
			TDLA.AOVR.22	<i>Measure clutch pack clearance; determine necessary action.</i>
			TDLA.AOVR.23	<i>Air test operation of clutch and servo assemblies.</i>
			TDLA.AOVR.24	<i>Inspect roller and sprag clutch, races, rollers, sprags, springs, cages and retainers; determine necessary action.</i>
			TDLA.AOVR.25	<i>Inspect bands and drums; determine necessary action.</i>
				MANUAL DRIVE TRAIN AND AXLES
2	1	N	CODE	Demonstrate ability in general drive train diagnosis (TDLA.MDTD)
			TDLA.MDTD.1	<i>Complete work order including customer information, vehicle identifying information, customer concern, related service history, cause, and correction.</i>
			TDLA.MDTD.2	<i>Identify and interpret drive train concern; determine necessary action.</i>
			TDLA.MDTD.3	<i>Research applicable vehicle and service information such as drive train system operation, fluid type, vehicle service history, service precautions and technical service bulletins.</i>
			TDLA.MDTD.4	<i>Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).</i>
			TDLA.MDTD.5	<i>Diagnose fluid loss, level and condition concerns; determine necessary action.</i>
			TDLA.MDTD.6	<i>Drain and fill manual transmission/transaxle and final drive unit.</i>
2	1	N	CODE	Demonstrate ability in clutch diagnosis and repair (TDLA.CDR)
			TDLA.CDR.1	<i>Diagnose clutch noise, binding, slippage, pulsation and chatter; determine necessary action</i>
			TDLA.CDR.2	<i>Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots and springs; perform necessary action</i>
			TDLA.CDR.3	<i>Inspect hydraulic clutch slave and master cylinders, lines and hoses; determine necessary action.</i>
			TDLA.CDR.4	<i>Inspect release (throw-out) bearing, lever and pivot; determine necessary action.</i>
			TDLA.CDR.5	<i>Inspect and replace clutch pressure plate assembly and clutch disc.</i>
			TDLA.CDR.6	<i>Bleed clutch hydraulic system</i>
			TDLA.CDR.7	<i>Inspect, remove or replace pilot bearing or bushing (as applicable).</i>
			TDLA.CDR.8	<i>Inspect flywheel and ring gear for wear and cracks; determine necessary action.</i>

			TDLA.CDR.9	<i>Inspect engine block, clutch (bell) housing, transmission/transaxle case mating surfaces and alignment dowels; determine necessary action.</i>
			TDLA.CDR.10	<i>Measure flywheel runout and crankshaft endplay; determine necessary action.</i>
2	1	N	CODE	Demonstrate ability in transmission/transaxle diagnosis and repair (TDLA.TTDR)
			TDLA.TTDR.1	<i>Remove and reinstall transmission/transaxle</i>
			TDLA.TTDR.2	<i>Disassemble, clean and reassemble transmission/transaxle components.</i>
			TDLA.TTDR.3	<i>Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings and vents; perform necessary action.</i>
			TDLA.TTDR.4	<i>Diagnose noise, hard shifting, jumping out of gear and fluid leakage concerns; determine necessary action.</i>
			TDLA.TTDR.5	<i>Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots and levers.</i>
			TDLA.TTDR.6	<i>Inspect and reinstall powertrain mounts.</i>
			TDLA.TTDR.7	<i>Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces.</i>
			TDLA.TTDR.8	<i>Remove and replace transaxle final drive.</i>
			TDLA.TTDR.9	<i>Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks and springs.</i>
			TDLA.TTDR.10	<i>Measure endplay or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action.</i>
			TDLA.TTDR.11	<i>Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs and blocking rings.</i>
			TDLA.TTDR.12	<i>Inspect and reinstall speedometer drive gear, driven gear, vehicle speed sensor (VSS) and retainers.</i>
			TDLA.TTDR.13	<i>Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary skills.</i>
			TDLA.TTDR.14	<i>Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly.</i>
			TDLA.TTDR.15	<i>Inspect lubrication devices (oil pump or slingers); perform necessary action.</i>
			TDLA.TTDR.16	<i>Inspect, test and replace transmission/transaxle sensors and switches.</i>
2	1	N	CODE	Demonstrate ability in drive shaft and half shaft, universal and constant-velocity (CV) joint diagnosis and repair (TDLA.SJDR)
			TDLA.SJDR.1	<i>Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action.</i>
			TDLA.SJDR.2	<i>Diagnose universal joint noise and vibration concerns; perform necessary action.</i>
			TDLA.SJDR.3	<i>Remove and replace front wheel drive (FWD) front wheel bearing.</i>
			TDLA.SJDR.4	<i>Inspect, service and replace shafts, yokes, boots and CV joints.</i>
			TDLA.SJDR.5	<i>Inspect, service and replace shaft center support bearings.</i>
			TDLA.SJDR.6	<i>Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles.</i>

2	1	N	CODE	Demonstrate ability in drive axle diagnosis and repair (TDLA.DADR)
				Ring and Pinion Gears and Differential Case Assembly
			TDLA.DADR.1	<i>Diagnose noise and vibration concerns; determine necessary action.</i>
			TDLA.DADR.2	<i>Diagnose fluid leakage concerns; determine necessary action.</i>
			TDLA.DADR.3	<i>Inspect and replace companion flange and pinion seal; measure companion flange runout.</i>
			TDLA.DADR.4	<i>Inspect ring gear and measure runout; determine necessary action.</i>
			TDLA.DADR.5	<i>Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves and bearings.</i>
			TDLA.DADR.6	<i>Measure and adjust drive pinion depth.</i>
			TDLA.DADR.7	<i>Measure and adjust drive pinion bearing preload.</i>
			TDLA.DADR.8	<i>Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a different carrier assembly (threaded cup or shim types).</i>
			TDLA.DADR.9	<i>Check ring and pinion tooth contact patterns; perform necessary action.</i>
			TDLA.DADR.10	<i>Disassemble, inspect, measure and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers and case.</i>
			TDLA.DADR.11	<i>Reassemble and reinstall differential case assembly; measure runout; determine necessary action.</i>
				Limited Slip Differential
			TDLA.DADR.12	<i>Diagnose noise, slippage, and chatter concerns; determine necessary action.</i>
			TDLA.DADR.13	<i>Clean and inspect differential housing; refill with correct lubricant.</i>
			TDLA.DADR.14	<i>Inspect and reinstall clutch (cone or plate) components.</i>
			TDLA.DADR.15	<i>Measure rotating torque; determine necessary action.</i>
				Drive Axle Shaft
			TDLA.DADR.16	<i>Diagnose drive axle shafts, bearings and seals for noise, vibration and fluid leakage concerns; determine necessary action.</i>
			TDLA.DADR.17	<i>Inspect and replace drive axle shaft wheel studs.</i>
			TDLA.DADR.18	<i>Remove and replace drive axle shafts.</i>
			TDLA.DADR.19	<i>Inspect and replace drive axle shaft seals, bearings and retainers.</i>
			TDLA.DADR.20	<i>Measure drive axle flange runout and shaft endplay; determine necessary action.</i>
2	1	N	CODE	Demonstrate ability to diagnose and repair four-wheel drive/all-wheel drive Components (TDLA.FWDR)
			TDLA.FWDR.1	<i>Diagnose noise, vibration and unusual steering concerns; determine necessary action.</i>
			TDLA.FWDR.2	<i>Inspect, adjust and repair shifting controls (mechanical, electrical and vacuum), bushings, mounts, levers and brackets.</i>
			TDLA.FWDR.3	<i>Remove and reinstall transfer case.</i>
			TDLA.FWDR.4	<i>Disassemble, service, and reassemble transfer case and components.</i>

			TDLA.FWDR.5	<i>Inspect front-wheel bearing and locking hubs; perform necessary action.</i>
			TDLA.FWDR.6	<i>Check drive assembly seals and vents; check lube level.</i>
			TDLA.FWDR.7	<i>Diagnose, test, adjust and replace electrical/electronic components of four-wheel drive systems.</i>
				SUSPENSION AND STEERING
2	1	N	CODE	Demonstrate ability to diagnose general suspension and steering systems (TDLA.GSSD)
			TDLA.GSSD.1	<i>Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause and correction.</i>
			TDLA.GSSD.2	<i>Identify and interpret suspension and steering concern; determine necessary action.</i>
			TDLA.GSSD.3	<i>Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions and technical service bulletins.</i>
			TDLA.GSSD.4	<i>Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).</i>
2	1	N	CODE	Demonstrate ability in steering system diagnosis and repair (TDLA.SSDR)
			TDLA.SSDR.1	<i>Disable and enable supplemental restraint system (SRS).</i>
			TDLA.SSDR.2	<i>Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).</i>
			TDLA.SSDR.3	<i>Diagnose steering column noises, looseness and binding concerns (including tilt mechanisms); determine necessary action.</i>
			TDLA.SSDR.4	<i>Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, noise and fluid leakage concerns; determine necessary action.</i>
			TDLA.SSDR.5	<i>Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, noise and fluid leakage concerns; determine necessary action.</i>
			TDLA.SSDR.6	<i>Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism and steering wheel; perform necessary action.</i>
			TDLA.SSDR.7	<i>Adjust manual or power non-rack and pinion worm bearing preload and sector lash.</i>
			TDLA.SSDR.8	<i>Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets.</i>
			TDLA.SSDR.9	<i>Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.</i>
			TDLA.SSDR.10	<i>Determine proper power steering fluid type; inspect fluid level and condition.</i>
			TDLA.SSDR.11	<i>Flush, fill, and bleed power steering system.</i>
			TDLA.SSDR.12	<i>Diagnose power steering fluid leakage; determine necessary action.</i>
			TDLA.SSDR.13	<i>Remove, inspect, replace and adjust power steering pump belt.</i>
			TDLA.SSDR.14	<i>Remove and reinstall power steering pump.</i>
			TDLA.SSDR.15	<i>Remove and reinstall power steering pump pulley; check pulley and belt alignment.</i>

			TDLA.SSDR.16	<i>Inspect and replace power steering hoses and fittings.</i>
			TDLA.SSDR.17	<i>Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings and steering linkage damper.</i>
			TDLA.SSDR.18	<i>Inspect, replace and adjust tie rod ends (sockets), tie rod sleeves and clamps.</i>
			TDLA.SSDR.19	<i>Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action.</i>
			TDLA.SSDR.20	<i>Inspect and test non-hydraulic electric power assist steering.</i>
			TDLA.SSDR.21	<i>Identify hybrid vehicle power steering system electrical circuits, service and safety precautions.</i>
2	1	N	CODE	Demonstrate ability in suspension system diagnosis and repair (TDLA.SUS)
				Front Suspension
			TDLA.SUS.1	<i>Diagnose short and long arm suspension system noises, body sway, and uneven riding height concerns; determine necessary action.</i>
			TDLA.SUS.2	<i>Diagnose strut suspension system noises, body sway and uneven riding height concerns; determine necessary action.</i>
			TDLA.SUS.3	<i>Remove, inspect and install upper and lower control arms, bushings, shafts and rebound bumpers.</i>
			TDLA.SUS.4	<i>Remove, inspect and install strut rods (compression/tension) and bushings.</i>
			TDLA.SUS.5	<i>Remove, inspect and install upper and/or lower ball joints.</i>
			TDLA.SUS.6	<i>Remove, inspect, and install steering knuckle assemblies.</i>
			TDLA.SUS.7	<i>Remove, inspect, and install short and long arm suspension system coil springs and spring insulators.</i>
			TDLA.SUS.8	<i>Remove, inspect, install and adjust suspension system torsion bars; inspect mounts.</i>
			TDLA.SUS.9	<i>Remove, inspect, and install stabilizer bar bushings, brackets and links.</i>
			TDLA.SUS.10	<i>Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.</i>
			TDLA.SUS.11	<i>Lubricate suspension and steering systems.</i>
				Rear Suspension
			TDLA.SUS..12	<i>Remove, inspect, and install coil springs and spring insulators.</i>
			TDLA.SUS.13	<i>Remove, inspect, and install transverse links, control arms, bushings and mounts.</i>
			TDLA.SUS.14	<i>Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.</i>
			TDLA.SUS.15	<i>Remove, inspect, and install strut cartridge or assembly, strut coil spring, and insulators (silencers).</i>
				Miscellaneous Service
			TDLA.SUS.16	<i>Inspect, remove and replace shock absorbers.</i>
			TDLA.SUS.17	<i>Remove, inspect, and service or replace front and rear wheel bearings.</i>
			TDLA.SUS.18	<i>Test and diagnose components of electronically controlled suspension systems using a scan tool; determine necessary action.</i>

2	1	N	CODE	Demonstrate ability in wheel alignment diagnosis, adjustment and repair (TDLA.WA)
			TDLA.WA.1	<i>Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action.</i>
			TDLA.WA.2	<i>Perform prealignment inspection; perform necessary action.</i>
			TDLA.WA.3	<i>Measure vehicle-riding height; determine necessary action.</i>
			TDLA.WA.4	<i>Check and adjust front and rear wheel camber; perform necessary action.</i>
			TDLA.WA.5	<i>Check and adjust caster; perform necessary action.</i>
			TDLA.WA.6	<i>Check and adjust front wheel toe and center steering wheel.</i>
			TDLA.WA.7	<i>Check toe-out-on turns (turning radius); determine necessary action.</i>
			TDLA.WA.8	<i>Check SAI (steering axis inclination) and included angle; determine necessary action.</i>
			TDLA.WA.9	<i>Check and adjust rear wheel toe.</i>
			TDLA.WA.10	<i>Check rear wheel thrust angle; determine necessary action.</i>
			TDLA.WA.11	<i>Check for front wheel setback; determine necessary action.</i>
			TDLA.WA.12	<i>Check front cradle (subframe) alignment; determine necessary action.</i>
2	1	N	CODE	Demonstrate ability in wheel and tire diagnosis and repair (TDLA.WT)
			TDLA.WT.1	<i>Diagnose tire wear patterns; determine necessary action.</i>
			TDLA.WT.2	<i>Inspect tires; check and adjust air pressure.</i>
			TDLA.WT.3	<i>Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.</i>
			TDLA.WT.4	<i>Rotate tires according to manufacturer's recommendations.</i>
			TDLA.WT.5	<i>Measure wheel, tire, axle and hub runout; determine necessary action.</i>
			TDLA.WT.6	<i>Diagnose tire pull (lead) problem; determine necessary action.</i>
			TDLA.WT.7	<i>Balance wheel and tire assembly (static and dynamic).</i>
			TDLA.WT.8	<i>Dismount, inspect and remount tire on wheel.</i>
			TDLA.WT.9	<i>Dismount, inspect and remount tire on wheel equipped with tire pressure sensor.</i>
			TDLA.WT.10	<i>Reinstall wheel; torque lug nuts.</i>
			TDLA.WT.11	<i>Inspect tire and wheel assembly for air loss; perform necessary action.</i>
			TDLA.WT.12	<i>Repair tire using internal patch.</i>
			TDLA.WT.13	<i>Inspect, diagnose and calibrate tire pressure monitoring system.</i>
				BRAKES
2	1	N	CODE	Demonstrate ability in general brake system diagnosis (TDLA.GBD)
			TDLA.GBD.1	<i>Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause and correction.</i>

			TDLA.GBD.2	<i>Identify and interpret brake system concern; determine necessary action.</i>
			TDLA.GBD.3	<i>Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.</i>
			TDLA.GBD.4	<i>Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).</i>
2	1	N	CODE	Demonstrate ability in hydraulic system diagnosis and repair (TDLA.HDR)
			TDLA.HDR.1	<i>Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).</i>
			TDLA.HDR.2	<i>Measure brake pedal height; determine necessary action.</i>
			TDLA.HDR.3	<i>Check master cylinder for internal and external leaks and proper operation; determine necessary action.</i>
			TDLA.HDR.4	<i>Remove, bench bleed and reinstall master cylinder.</i>
			TDLA.HDR.5	<i>Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.</i>
			TDLA.HDR.6	<i>Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action.</i>
			TDLA.HDR.7	<i>Fabricate and/or install brake lines (double flare and ISO types); replace hoses, fittings and supports as needed.</i>
			TDLA.HDR.8	<i>Select, handle, store and fill brake fluids to proper level.</i>
			TDLA.HDR.9	<i>Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential and combination valves.</i>
			TDLA.HDR.10	<i>Inspect, test and adjust height (load) sensing proportioning valve.</i>
			TDLA.HDR.11	<i>Inspect, test, and/or replace components of brake warning light system.</i>
			TDLA.HDR.12	<i>Bleed (manual, pressure, vacuum or surge) brake system.</i>
			TDLA.HDR.13	<i>Flush hydraulic system.</i>
2	1	N	CODE	Demonstrate ability in drum brake diagnosis and repair (TDLA.DRB)
			TDLA.DRB.1	<i>Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.</i>
			TDLA.DRB.2	<i>Remove, clean (using proper safety procedures), inspect and measure brake drums: determine necessary action.</i>
			TDLA.DRB.3	<i>Refinish brake drum.</i>
			TDLA.DRB.4	<i>Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.</i>
			TDLA.DRB.5	<i>Remove, inspect and install wheel cylinders.</i>
			TDLA.DRB.6	<i>Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings.</i>
			TDLA.DRB.7	<i>Install wheel, torque lug nuts and make final checks and adjustments.</i>

2	1	N	CODE	Demonstrate ability in disc brake diagnosis and repair (TDLA.DIB)
			TDLA.DIB.1	<i>Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.</i>
			TDLA.DIB.2	<i>Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action.</i>
			TDLA.DIB.3	<i>Clean and inspect caliper mounting and slides for wear and damage; determine necessary action.</i>
			TDLA.DIB.4	<i>Remove, clean, and inspect pads and retaining hardware; determine necessary action.</i>
			TDLA.DIB.5	<i>Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring and damage; replace seal, boot and damaged or worn parts.</i>
			TDLA.DIB.6	<i>Reassemble, lubricate, and reinstall caliper, pads and related hardware; seat pads, and inspect for leaks.</i>
			TDLA.DIB.7	<i>Clean, inspect and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace.</i>
			TDLA.DIB.8	<i>Remove and reinstall rotor.</i>
			TDLA.DIB.9	<i>Refinish rotor on vehicle.</i>
			TDLA.DIB.10	<i>Refinish rotor off vehicle.</i>
			TDLA.DIB.11	<i>Adjust calipers equipped with an integrated parking brake system.</i>
			TDLA.DIB.12	<i>Install wheel, torque lug nuts and make final checks and adjustments.</i>
2	1	N	CODE	Demonstrate ability in power assist unit diagnosis and repair (TDLA.PAB)
			TDLA.PAB.1	<i>Test pedal free travel with and without engine running; check power assist operation.</i>
			TDLA.PAB.2	<i>Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.</i>
			TDLA.PAB.3	<i>Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action.</i>
			TDLA.PAB.4	<i>Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action.</i>
			TDLA.PAB.5	<i>Measure and adjust master cylinder pushrod length.</i>
2	1	N	CODE	Demonstrate ability in miscellaneous suspension (wheel bearings, parking brakes, electrical, etc.) diagnosis and repair (TDLA.MIS)
			TDLA.MIS.1	<i>Diagnose wheel bearing noises, wheel shimmy and vibration concerns; determine necessary action.</i>
			TDLA.MIS.2	<i>Remove, clean, inspect, repack and install wheel bearings and replace seals; install hub and adjust wheel bearings.</i>
			TDLA.MIS.3	<i>Check parking brake cables and components for wear, rusting, binding and corrosion; clean, lubricate, or replace as needed.</i>
			TDLA.MIS.4	<i>Check parking brake operation; determine necessary action.</i>

			TDLA.MIS.5	<i>Check operation of parking brake indicator light system.</i>
			TDLA.MIS.6	<i>Check operation of brake stop light system; determine necessary action.</i>
			TDLA.MIS.7	<i>Replace wheel bearing and race.</i>
			TDLA.MIS.8	<i>Inspect and replace wheel studs.</i>
			TDLA.MIS.9	<i>Remove and reinstall sealed wheel bearing assembly.</i>
2	1	N	CODE	Demonstrate ability in anti-lock brake and traction control system diagnosis and repair (TDLA.ABTC)
			TDLA.ABTC.1	<i>Identify and inspect antilock brake system (ABS) components; determine necessary action.</i>
			TDLA.ABTC.2	<i>Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation and noise concerns caused by the antilock brake system(ABS); determine necessary action.</i>
			TDLA.ABTC.3	<i>Diagnose antilock brake system (ABS) electronic controls(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action.</i>
			TDLA.ABTC.4	<i>Depressurize high-pressure components of the antilock brake system (ABS).</i>
			TDLA.ABTC.5	<i>Bleed the antilock brake system's (ABS) front and rear hydraulic circuits.</i>
			TDLA.ABTC.6	<i>Remove and install antilock brake system (ABS) electrical/electronic and hydraulic components.</i>
			TDLA.ABTC.7	<i>Test, diagnose and service ABS speed sensors, toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground and frequency data).</i>
			TDLA.ABTC.8	<i>Diagnose antilock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).</i>
			TDLA.ABTC.9	<i>Identify traction control/vehicle stability control system components.</i>
				ELECTRICAL/ELECTRONIC SYSTEMS
2	1	N	CODE	Demonstrate ability in general electrical system diagnosis (TDLA.ESD)
			TDLA.ESD.1	<i>Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.</i>
			TDLA.ESD.2	<i>Identify and interpret electrical/electronic system concern; determine necessary action.</i>
			TDLA.ESD.3	<i>Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.</i>
			TDLA.ESD.4	<i>Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).</i>
			TDLA.ESD.5	<i>Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).</i>
			TDLA.ESD.6	<i>Using wiring diagrams during diagnosis of electrical circuit problems.</i>
			TDLA.ESD.7	<i>Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.</i>

			TDLA.ESD.8	<i>Check electrical circuits with a test light; determine necessary action.</i>
			TDLA.ESD.9	<i>Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action.</i>
			TDLA.ESD.10	<i>Measure current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.</i>
			TDLA.ESD.11	<i>Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action.</i>
			TDLA.ESD.12	<i>Check electrical circuits using fused jumper wires; determine necessary action.</i>
			TDLA.ESD.13	<i>Locate shorts, grounds, opens and resistance problems in electrical/electronic circuits; determine necessary action.</i>
			TDLA.ESD.14	<i>Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.</i>
			TDLA.ESD.15	<i>Inspect and test fusible links, circuit breakers and fuses; determine necessary action.</i>
			TDLA.ESD.16	<i>Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.</i>
			TDLA.ESD.17	<i>Remove and replace terminal end from connector.</i>
			TDLA.ESD.18	<i>Repair connectors and terminal ends.</i>
			TDLA.ESD.19	<i>Repair wiring harness (including CAN/BUS systems).</i>
			TDLA.ESD.20	<i>Perform solder repair of electrical wiring.</i>
			TDLA.ESD.21	<i>Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.</i>
2	1	N	CODE	Demonstrate ability in battery diagnosis and service (TDLA.BDS)
			TDLA.BDS.1	<i>Perform battery state-of-charge test; determine necessary action.</i>
			TDLA.BDS.2	<i>Perform battery capacity test (or conductance test); confirm proper battery capacity for vehicle application; determine necessary action.</i>
			TDLA.BDS.3	<i>Maintain or restore electronic memory functions.</i>
			TDLA.BDS.4	<i>Inspect, clean, fill and replace battery.</i>
			TDLA.BDS.5	<i>Perform slow/fast battery charge.</i>
			TDLA.BDS.6	<i>Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.</i>
			TDLA.BDS.7	<i>Start a vehicle using jumper cables and a battery or auxiliary power supply.</i>
			TDLA.BDS.8	<i>Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions.</i>
			TDLA.BDS.9	<i>Identify electronic modules, security systems and/or radios that require reinitialization or code entry following battery disconnect.</i>
			TDLA.BDS.10	<i>Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures.</i>
2	1	N	CODE	Demonstrate ability in starting system diagnosis and repair (TDLA.STDR)

			TDLA.STDR.1	<i>Perform starter current draw tests; determine necessary action.</i>
			TDLA.STDR.2	<i>Perform starter circuit voltage drop tests; determine necessary action.</i>
			TDLA.STDR.3	<i>Inspect and test starter relays and solenoids; determine necessary action.</i>
			TDLA.STDR.4	<i>Remove and install starter in a vehicle.</i>
			TDLA.STDR.5	<i>Inspect and test switches, connectors and wires of starter control circuits; Perform Necessary action.</i>
			TDLA.STDR.6	<i>Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.</i>
2	1	N	CODE	Demonstrate ability in charging system diagnosis and repair (TDLA.CSDR)
			TDLA.CSDR.1	<i>Perform charging system output test; determine necessary action.</i>
			TDLA.CSDR.2	<i>Diagnose charging system for the cause of undercharge, no-charge and overcharge conditions.</i>
			TDLA.CSDR.3	<i>Inspect, adjust, or replace generator (alternator) drive belts, pulleys and tensioners; check pulley and belt alignment.</i>
			TDLA.CSDR.4	<i>Remove, inspect and install generator (alternator).</i>
			TDLA.CSDR.5	<i>Perform charging circuit voltage drop tests; determine necessary action.</i>
2	1	N	CODE	Demonstrate ability in lighting system diagnosis and repair (TDLA.LSDR)
			TDLA.LSDR.1	<i>Diagnose the cause of brighter than normal, intermittent, dim or no light operation; determine necessary action.</i>
			TDLA.LSDR.2	<i>Inspect, replace and aim headlights and bulbs.</i>
			TDLA.LSDR.3	<i>Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.</i>
			TDLA.LSDR.4	<i>Identify system voltage and safety precautions associated with high intensity discharge headlights.</i>
2	1	N	CODE	Demonstrate ability in gauges, warning devices and driver information systems diagnosis and repair (TDLA.GWDR)
			TDLA.GWDR.1	<i>Inspect and test gauges and gauge sending units for cause of intermittent, high, low or no gauge readings; determine necessary action.</i>
			TDLA.GWDR.2	<i>Inspect and test connectors, wires and printed circuit boards of gauge circuits; determine necessary action.</i>
			TDLA.GWDR.3	<i>Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.</i>
			TDLA.GWDR.4	<i>Inspect and test sensors, connectors and wires of electronic (digital) instrument circuits; determine necessary action.</i>
2	1	N	CODE	Demonstrate ability in horn and wiper/washer diagnosis and repair (TDLA.HWDR)
			TDLA.HWDL.1	<i>Diagnose incorrect horn operation; perform necessary action.</i>

			TDLA.HWDL.2	<i>Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action</i>
			TDLA.HWDL.3	<i>Diagnose incorrect washer operation; perform necessary action</i>
2	1	N	CODE	Demonstrate ability in accessories diagnosis and repair (TDLA.ADR)
			TDLA.ADR.1	<i>Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action.</i>
			TDLA.ADR.2	<i>Diagnose incorrect heated glass, mirror or seat operation; determine necessary action.</i>
			TDLA.ADR.3	<i>Diagnose incorrect electric lock operation; determine necessary action.</i>
			TDLA.ADR.4	<i>Diagnose incorrect operation of cruise control systems; determine necessary action.</i>
			TDLA.ADR.5	<i>Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (Note: Follow manufacturer's safety procedures to prevent accidental deployment.</i>
			TDLA.ADR.6	<i>Disarm and enable the airbag system for vehicle service.</i>
			TDLA.ADR.7	<i>Diagnose radio static and weak, intermittent or no radio reception; determine necessary action.</i>
			TDLA.ADR.8	<i>Remove and reinstall door panel.</i>
			TDLA.ADR.9	<i>Diagnose body electronic system circuits using a scan tool; determine necessary action.</i>
			TDLA.ADR.10	<i>Check for module communication (including CAN/BUS systems) errors using a scan tool.</i>
			TDLA.ADR.11	<i>Diagnose the cause of false, intermittent or no operation of anti-theft systems.</i>
				HEATING AND AIR CONDITIONING
2	1	N	CODE	Demonstrate ability in A/C system diagnosis and repair (TDLA.ACDR)
			TDLA.ACDR.1	<i>Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause and correction.</i>
			TDLA.ACDR.2	<i>Identify and interpret heating and air conditioning concern; determine necessary action.</i>
			TDLA.ACDR.3	<i>Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions and technical service bulletins.</i>
			TDLA.ACDR.4	<i>Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).</i>
			TDLA.ACDR.5	<i>Performance test A/C system; diagnose A/C system malfunctions using principles of refrigeration.</i>
			TDLA.ACDR.6	<i>Diagnose abnormal operating noises in the A/C system; determine necessary action.</i>
			TDLA.ACDR.7	<i>Identify refrigerant type; select and connect proper gauge set; record pressure readings.</i>
			TDLA.ACDR.8	<i>Leak test A/C system; determine necessary action.</i>
			TDLA.ACDR.9	<i>Inspect the condition of discharge oil; determine necessary action.</i>
			TDLA.ACDR.10	<i>Determine recommended oil for system application.</i>
			TDLA.ACDR.11	<i>Using scan tool, observe and record related HVAC data and trouble codes.</i>

2	1	N	CODE	Demonstrate ability in refrigeration system component diagnosis and repair (TDLA.RDR)
				Compressor and Clutch
			TDLA.RDR.1	<i>Diagnose A/C system conditions that cause the protection devices (pressure, thermal and PCM) to interrupt system operation; determine necessary action.</i>
			TDLA.RDR.2	<i>Inspect and replace A/C compressor drive belts; determine necessary action.</i>
			TDLA.RDR.3	<i>Inspect, test, and/or replace A/C compressor clutch components and/or assembly.</i>
			TDLA.RDR.4	<i>Remove, inspect and reinstall A/C compressor and mountings; determine required oil quantity.</i>
			TDLA.RDR.5	<i>Identify hybrid vehicle A/C system electrical circuits, service and safety precautions.</i>
				Evaporator, Condenser and Related Components
			TDLA.RDR.6	<i>Determine need for an additional A/C system filter; perform necessary action.</i>
			TDLA.RDR.7	<i>Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals and service valves; perform necessary action.</i>
			TDLA.RDR.8	<i>Inspect A/C condenser for airflow restrictions; perform necessary action.</i>
			TDLA.RDR.9	<i>Remove, inspect and reinstall receiver/drier or accumulator/drier; determine required oil quantity.</i>
			TDLA.RDR.10	<i>Remove and install expansion valve or orifice (expansion) tube.</i>
			TDLA.RDR.11	<i>Inspect evaporator housing water drain; perform necessary action.</i>
			TDLA.RDR.12	<i>Remove, inspect, and reinstall evaporator; determine required oil quantity.</i>
			TDLA.RDR.13	<i>Remove, inspect and install condenser; determine required oil quantity.</i>
2	1	N	CODE	Demonstrate ability in heating, ventilation and engine cooling systems diagnosis and repair (TDLA.HCDR)
			TDLA.HCDR.1	<i>Diagnose temperature control problems in the heater/ventilation system; determine necessary action.</i>
			TDLA.HCDR.2	<i>Perform cooling system pressure tests; check coolant condition, inspect and test radiator, pressure cap, coolant recovery tank and hoses; perform necessary action.</i>
			TDLA.HCDR.3	<i>Inspect engine cooling and heater system hoses and belts; perform necessary action.</i>
			TDLA.HCDR.4	<i>Inspect, test and replace thermostat and gasket.</i>
			TDLA.HCDR.5	<i>Determine coolant condition and coolant type for vehicle application; drain and recover coolant.</i>
			TDLA.HCDR.6	<i>Flush system; refill system with recommended coolant; bleed system.</i>
			TDLA.HCDR.7	<i>Inspect and test cooling fan, fan clutch, fan shroud and air dams; perform necessary action.</i>
			TDLA.HCDR.8	<i>Inspect and test electric cooling fan, fan control system and circuits; determine necessary action.</i>
			TDLA.HCDR.9	<i>Inspect and test heater control valve(s); perform necessary action.</i>
			TDLA.HCDR.10	<i>Remove, inspect and reinstall heater core.</i>

2	1	N	CODE	Demonstrate ability in operating systems and related controls diagnosis and repair (TDLA.OSDR)
			TDLA.OSDR.1	<i>Diagnose malfunctions in the electrical controls of heating, ventilation and A/C (HVAC) systems; determine necessary action.</i>
			TDLA.OSDR.2	<i>Inspect and test A/C –heater blower, motors, resistors, switches, relays, wiring and protection devices; perform necessary action.</i>
			TDLA.OSDR.3	<i>Test and diagnose A/C compressor clutch control systems; determine necessary action.</i>
			TDLA.OSDR.4	<i>Diagnose malfunctions in the vacuum, mechanical and electrical components and controls of the heating, ventilation and A/C (HVAC) system, determine necessary action.</i>
			TDLA.OSDR.5	<i>Inspect and test A/C-heater control panel assembly; determine necessary action.</i>
			TDLA.OSDR.6	<i>Inspect and test A/C/heater control cables, motors and linkages; perform necessary action.</i>
			TDLA.OSDR.7	<i>Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action.</i>
			TDLA.OSDR.8	<i>Check operation of automatic and semi-automatic heating, ventilation and air-conditioning (HVAC) control systems; determine necessary action.</i>
2	1	N	CODE	Demonstrate ability in refrigerant recovery, recycling and handling (TDLA.RRRH)
			TDLA.RRRH.1	<i>Perform correct use and maintenance of refrigerant handling equipment.</i>
			TDLA.RRRH.2	<i>Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant.</i>
			TDLA.RRRH.3	<i>Recycle refrigerant.</i>
			TDLA.RRRH.4	<i>Label and store refrigerant.</i>
			TDLA.RRRH.5	<i>Test recycled refrigerant for non-condensable gases.</i>
			TDLA.RRRH.6	<i>Evacuate and charge A/C system.</i>
				ENGINE PERFORMANCE
2	1	N	CODE	Demonstrate ability in general engine diagnosis (TDLA.GED)
			TDLA.GED.1	<i>Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.</i>
			TDLA.GED.2	<i>Identify and interpret engine performance concern; determine necessary action.</i>
			TDLA.GED.3	<i>Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions and service bulletins.</i>
			TDLA.GED.4	<i>Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels and calibration decals).</i>
			TDLA.GED.5	<i>Inspect engine assembly for fuel, oil, coolant and other leaks; determine necessary action.</i>
			TDLA.GED.6	<i>Diagnose abnormal engine noise or vibration concerns; determine necessary action.</i>

			TDLA.GED.7	<i>Diagnose abnormal exhaust color, odor and sound; determine necessary action.</i>
			TDLA.GED.8	<i>Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.</i>
			TDLA.GED.9	<i>Perform cylinder power balance test; determine necessary action.</i>
			TDLA.GED.10	<i>Perform cylinder cranking compression tests; determine necessary action.</i>
			TDLA.GED.11	<i>Perform engine running compression test; determine necessary action.</i>
			TDLA.GED.12	<i>Perform cylinder leakage test; determine necessary action.</i>
			TDLA.GED.13	<i>Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action.</i>
			TDLA.GED.14	<i>Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test and obtain exhaust readings; interpret reading and determine necessary action.</i>
			TDLA.GED.15	<i>Verify engine operating temperature; determine necessary action.</i>
			TDLA.GED.16	<i>Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank and hoses; perform necessary action.</i>
			TDLA.GED.17	<i>Verify correct camshaft timing.</i>
2	1	N	CODE	Demonstrate ability in computerized engine controls diagnosis and repair (TDLA.CEC)
			TDLA.CEC.1	<i>Retrieve and record stored OBD I diagnostic trouble codes; clear codes.</i>
			TDLA.CEC.2	<i>Retrieve and record stored OBD II diagnostic trouble codes; clear codes when applicable.</i>
			TDLA.CEC.3	<i>Diagnose the causes of emissions or drivability concerns resulting from malfunctions in the computerized engine control system with stored diagnostic trouble codes.</i>
			TDLA.CEC.4	<i>Diagnose emissions or drivability concerns resulting from malfunctions in the computerized engine control system with no stored diagnostic trouble codes; determine necessary action.</i>
			TDLA.CEC.5	<i>Check for module communication (including CAN/BUS systems) errors using a scan tool.</i>
			TDLA.CEC.6	<i>Inspect and test computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DS); perform necessary action.</i>
			TDLA.CEC.7	<i>Obtain and interpret scan tool data.</i>
			TDLA.CEC.8	<i>Access and use service information to perform step-by-step diagnosis.</i>
			TDLA.CEC.9	<i>Diagnose drivability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM-installed accessories, or similar systems); determine necessary action.</i>
			TDLA.CEC.10	<i>Perform active tests of actuators using scan tool; determine necessary action.</i>
2	1	N	CODE	Demonstrate ability in ignition system diagnosis and repair (TDLA.IDR)
			TDLA.IDR.1	<i>Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor drivability, spark knock, power loss, poor mileage and emissions concerns on vehicles with electronic ignition (distributorless) systems; determine necessary action.</i>

			TDLA.IDR.2	<i>Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor drivability, spark knock, power loss, poor mileage and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action.</i>
			TDLA.IDR.3	<i>Inspect and test ignition primary circuit wiring and solid state components; perform necessary action.</i>
			TDLA.IDR.4	<i>Inspect, test and service distributor.</i>
			TDLA.IDR.5	<i>Inspect and test ignition system secondary circuit wiring and components; perform necessary action.</i>
			TDLA.IDR.6	<i>Inspect and test ignition coil(s); perform necessary action.</i>
			TDLA.IDR.7	<i>Check and adjust ignition system timing and timing advance/retard (where applicable).</i>
			TDLA.IDR.8	<i>Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action.</i>
2	1	N	CODE	Demonstrate ability in fuel, air induction and exhaust system diagnosis and repair (TDLA.FEDR)
			TDLA.FEDR.1	<i>Diagnose hot or cold no-starting, hard starting poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling and emissions problems on vehicles with injection-type fuel systems; determine necessary action.</i>
			TDLA.FEDR.2	<i>Check fuel for contaminants and quality; determine necessary action.</i>
			TDLA.FEDR.3	<i>Inspect and test fuel pumps and pump control systems for pressure, regulation and volume; perform necessary action.</i>
			TDLA.FEDR.4	<i>Replace fuel filters.</i>
			TDLA.FEDR.5	<i>Inspect and test cold enrichment system and components; perform necessary action.</i>
			TDLA.FEDR.6	<i>Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.</i>
			TDLA.FEDR.7	<i>Inspect and test fuel injectors.</i>
			TDLA.FEDR.8	<i>Check idle speed.</i>
			TDLA.FEDR.9	<i>Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonators(s), tail pipe(s) and heat shields(s); perform necessary action.</i>
			TDLA.FEDR.10	<i>Perform exhaust system back-pressure test; determine necessary action.</i>
			TDLA.FEDR.11	<i>Test the operation of turbocharger/supercharger systems; determine necessary action.</i>
2	1	N	CODE	Demonstrate ability in emission control systems diagnosis and repair (TDLA.ECDR)
				Positive Crankcase Ventilation
			TDLA.ECDR.1	<i>Diagnose oil leaks, emissions and drivability problems resulting from malfunctions in the positive crankcase ventilation (PCV) system; determine necessary action.</i>
			TDLA.ECDR.2	<i>Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices and hoses; perform necessary action.</i>

				Exhaust Gas Recirculation
			TDLA.ECDR.3	<i>Diagnose emissions and drivability problems caused by malfunctions in the exhaust gas recirculation (EGR) system; determine necessary action.</i>
			TDLA.ECDR.4	<i>Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.</i>
			TDLA.ECDR.5	<i>Inspect and test electrical/electronic sensors, controls and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.</i>
				Exhaust Gas Treatment
			TDLA.ECDR.6	<i>Diagnose emissions and drivability problems resulting by malfunctions in the secondary air injection and catalytic converter systems; determine necessary action.</i>
			TDLA.ECDR.7	<i>Inspect and test mechanical components of secondary air injection systems; perform necessary action.</i>
			TDLA.ECDR.8	<i>Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.</i>
			TDLA.ECDR.9	<i>Inspect and test catalytic converter performance.</i>
				Evaporative Emissions Controls
			TDLA.ECDR.10	<i>Diagnose emissions and drivability problems resulting from malfunctions in the evaporative emissions control system; determine necessary action.</i>
			TDLA.ECDR.11	<i>Inspect and test components and hoses of evaporative emissions control system; perform necessary action.</i>
			TDLA.ECDR.12	<i>Interpret evaporative emission related diagnostic trouble codes (DTCs); determine necessary action.</i>
2	1	N	CODE	Demonstrate ability in engine related service (TDLA.ERS)
			TDLA.ERS.1	<i>Adjust valves on engines with mechanical or hydraulic lifters.</i>
			TDLA.ERS.2	<i>Remove and replace timing belt; verify correct camshaft timing.</i>
			TDLA.ERS.3	<i>Remove and replace thermostat and gasket.</i>
			TDLA.ERS.4	<i>Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.</i>
			TDLA.ERS.5	<i>Perform common fastener and thread repairs to include: remove broken bolt, restore internal and external threads and repair internal threads with thread insert.</i>
			TDLA.ERS.6	<i>Perform oil and filter change.</i>
			TDLA.ERS.7	<i>Demonstrate proficiency in using oxy-acetylene torch to heat and cut metal.</i>
			TDLA.ERS.8	<i>Identify hybrid vehicle internal combustion engine service precautions.</i>

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