

**Course Title:** Automotive Maintenance and Light Repair 1  
**Course Number:** 9504110  
**Course Credit:** 1

**Course Description:**

The Automotive Maintenance and Light Repair 1 course prepare students for entry into Automotive Maintenance and Light Repair 2. Students explore career opportunities and requirements of a professional service technician. Content emphasizes beginning transportation service skills and workplace success skills. Students study safety, tools, equipment, shop operations, basic engine fundamentals, and basic technician skills.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science  
 ER = Engine Repair  
 ASE = Required Supplemental Tasks

<b>ER Task List:</b>	
P-1 =	12
P-2 =	0
P-3 =	1
<b>Total</b>	<b>13</b>

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSSS-Sci
04.0 Proficiently explain and apply required shop and personal safety tasks relating to the automotive industry--The student will be able to:			
04.01 Identify and apply general shop safety rules and procedures, EPA and OSHA standards.	ASE	LAFS.910.RI.1.1, 2; 3.8	
04.02 Demonstrate knowledge of appropriate automotive industry certifications.		LAFS.910.W.2.6; 3.7, 8 LAFS.910.L.1.2C	
04.03 Research, identify, and interpret the Federal 'Workers Right To Know Law'.		LAFS.910.W.2.6 LAFS.910.L.1.2C	
04.04 Identify and use appropriate emergency first aid procedures.		LAFS.910.RI.1.1, 2; 3.8	
04.05 Utilize and demonstrate safe procedures for handling of tools and equipment.	ASE	LAFS.910.W.3.9 LAFS.910.L.1.2C	
04.06 Identify and use proper placement of floor jacks and jack stands.	ASE	LAFS.910.RI.1.1	SC.912.P.12.3
04.07 Identify and use proper procedures for safe lift operation.	ASE	LAFS.910.RI.1.1	SC.912.P.12.3

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
04.08 Utilize proper ventilation procedures for working within the lab/shop area.	ASE	LAFS.910.RI.1.1	SC.912.E.6.6
04.09 Identify and use proper procedures for safe pit usage.		LAFS.910.RI.1.1	
04.10 Identify marked safety areas.	ASE	LAFS.910.RI.1.1	
04.11 Identify the location and the types of fire extinguishers and other fire safety equipment.	ASE	LAFS.910.RI.1.1	SC.912.P.8.1
04.12 Demonstrate knowledge of the procedures for using fire extinguishers and other safety equipment.	ASE	LAFS.910.RI.1.1	
04.13 Identify the location and use of eye wash stations.	ASE		
04.14 Identify the location of the posted evacuation routes.	ASE		
04.15 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.	ASE		
04.16 Identify and wear appropriate clothing for lab/shop activities.	ASE		
04.17 Secure hair and jewelry for lab/shop activities.	ASE		
04.18 Use proper handling procedures for automotive fluids.		LAFS.910.RI.1.1, 2; 3.8	SC.912.P.8.1, 2; 12.12
04.19 Identify and describe typical automotive lubricants and lubricant properties.		LAFS.910.RI.1.1, LAFS.910.W.1.2A, B, C, D, E, F; 2.4, 6 LAFS.910.L.1.2C LAFS.910.SL.1.2; 2.4	SC.912.P.8.1, 2; 12.12
04.20 Identify and describe the proper procedure to apply and remove automotive fasteners, including thread inserts.		LAFS.910.RI.1.1, LAFS.910.W.1.2A, B, C, D, E, F; 2.4, 6 LAFS.910.L.1.2C LAFS.910.SL.1.2; 2.4	
04.21 Identify and describe typical automotive seals and gaskets.		LAFS.910.RI.1.1	
04.22 Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.	ASE	LAFS.910.RI.1.1	
04.23 Disable supplemental restraint systems (SRS) in accordance with manufacturers' procedures.		LAFS.910.RI.1.1	
04.24 Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.)	ASE	LAFS.910.RI.1.1	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
04.25 Locate and demonstrate knowledge of material safety data sheets (MSDS).	ASE	LAFS.910.RI.2.4	
05.0 Explain and apply required tasks associated with the proper use and handling of tools and equipment relating to the automotive industry--The student will be able to:			
05.01 Identify tools and equipment and their appropriate usage in automotive applications.	ASE		
05.02 Identify and use standard and metric measurement skills and designation.	ASE	MAFS.912.N-Q.1.1, 1.3	
05.03 Demonstrate proper cleaning, storage, and maintenance of tools and equipment.	ASE		
05.04 Demonstrate proper use of precision-measuring tools (i.e. micrometer, digital/dial-indicator, digital/dial-caliper) and torque methods.	ASE	MAFS.912.N-Q.1.1, 3	
06.0 Demonstrate proficiency in preparing vehicle for routine pre/post maintenance and customer services --The student will be able to:			
06.01 Identify information needed and the service requested on a repair order.	ASE	LAFS.910.W.1.2A, B, C, D, E, F; 2.4 LAFS.910.L.1.2C	
06.02 Identify automobiles according to engine location, cylinders, type of drive system, purpose, etc.		LAFS.910.RI.1.1	
06.03 Identify purpose and demonstrate proper use of fender covers, floor mats and other vehicle protection equipment.	ASE	LAFS.910.RI.1.1	
06.04 Demonstrate use of the three C's (Concern, Cause, and Correction).	ASE	LAFS.910.W.1.2A, B, C, D, E, F; 2.4 LAFS.910.L.1.2C	
06.05 Review vehicle service history.	ASE	LAFS.910.RI.1.2, .3	
06.06 Use computer and operate keyboard.			
06.07 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	ASE	LAFS.910.W.1.2A, B, C, D, E, F; 2.4 LAFS.910.L.1.2C	
06.08 Conduct an appropriate pre-service evaluation and report or note any concerns not already on the repair order.		LAFS.910.W.1.2A, B, C, D, E, F; 2.4 LAFS.910.L.1.2C	
06.09 Determine the presence of a Tire Pressure Monitoring System (TPMS).			
06.10 Determine the presence of wheel locks.			
06.11 Determine the presence of an air suspension system.			

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
06.12 Check operation and status of instrument panel warning lights and gauges.			
06.13 Locate and use the Vehicle Identification Number (VIN).		LAFS.910.RI.1.1	
06.14 Locate and use vehicle information placards, decals, tags, as required.		LAFS.910.RI.1.1	
06.15 Locate and use paper and electronic manuals.		LAFS.910.L.3.4A, C; 3.6	
06.16 Locate and use technical service bulletins (TSBs).		LAFS.910.L.3.4A, C; 3.6	
06.17 Utilize flat rate manuals, service manuals, service bulletins, parts manuals and electronic service information.		LAFS.910.RI.1.1; 2.4	
06.18 Use proper chemicals for cleaning and lubrication.			SC.912.P.8.1, 2, 8
06.19 Reset maintenance indicators.			
06.20 Verify status of instrument panel warning lights and gauges.			
06.21 Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).	ASE		
06.22 Inspect underhood area for leaks, damage, and unusual conditions.			
06.23 Determine fluid type requirements and identify fluid.		LAFS.910.RI.1.1; 2.4	SC.912.P.8.1, 2
06.24 Check engine oil level and condition; service as required.			
06.25 Check engine coolant level and condition; service as required.			
06.26 Check power steering fluid level and condition; service as required.			
06.27 Check brake fluid level and condition; service as required.			
06.28 Check hydraulic clutch fluid and condition; service as required.			
06.29 Check windshield washer fluid level and condition; service as required.			
06.30 Check automatic transmission fluid level and condition; service as required.			
06.31 Inspect undercar area for leaks, damage, and unusual conditions.			

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
06.32 Check differential/transfer case fluid level; note unusual conditions; service as required.		LAFS.910.W.1.2D, E LAFS.910.L.1.2C	
06.33 Check manual transmission fluid level; note unusual conditions; service as required.		LAFS.910.W.1.2D, E LAFS.910.L.1.2C	
06.34 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear.			
06.35 Lubricate driveline, suspension and steering systems.			
06.36 Inspect cooling system pipes and hoses for wear, damage, and proper routing.			
06.37 Change engine oil and filter.			
06.38 Replace inline fuel filters as applicable.			
06.39 Inspect and replace air filter.			
06.40 Inspect and replace cabin air filter.			
06.41 Inspect, replace and adjust drive belts; inspect tensioners and pulleys.			
06.42 Document observed damage, unusual conditions, and concerns.		LAFS.910.W.2.4 LAFS.910.L.1.2C; 3.6	
06.43 Visually inspect struts, springs, and related components.			
06.44 Visually inspect stabilizer bar, bushings, brackets, and links.			
06.45 Visually inspect springs, torsion bars, and related components.			
06.46 Visually inspect shock absorbers and related components.			
06.47 Visually inspect constant velocity (CV) axle shaft boots.			
06.48 Identify service considerations when equipped with a Tire Pressure Monitoring System (TPMS).			
06.49 Identify nitrogen-filled tires.		LAFS.910.RI.1.1	
06.50 Inspect tires; inspect spare and mounting system; check and adjust tire pressure.			
06.51 Rotate tires according to recommendations.			
06.52 Balance wheel and tire assembly.			

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
06.53 Dismount, inspect, and remount tire on wheel.			
06.54 Repair tire according to industry standards.			
06.55 Reinstall wheel; torque wheel fasteners to specification.		LAFS.910.RI.1.1 MAFS.912.N-Q.1.1, 3	
06.56 Check wheel bearings for play and other signs of wear.			
06.57 Perform a visual inspection of a brake drum system.			
06.58 Perform a visual inspection of a disc brake system.			
06.59 Check parking brake operation; check parking brake components for unusual conditions.			
06.60 Document damage, unusual conditions and concerns.		LAFS.910.W.2.4, LAFS.910.L.1.2C; 3.6	
06.61 Check wiper blades, inserts, and arms; replace wiper blades or inserts.			
06.62 Lubricate door latches and hinges.			
06.63 Inspect fuel cap and seal.			SC.912.E.6.6
06.64 Charge battery as needed.			SC.912.P.12.12
06.65 Inspect and clean battery hold-downs; repair or replace as needed.			
06.66 Inspect and clean battery and battery cable clamp connections.			
06.67 Perform battery, starting, and charging system tests using appropriate tester.			
06.68 Start vehicle using an auxiliary power supply.			
06.69 Maintain or restore electronic memory functions if required.			
06.70 Test and replace fuses; confirm proper circuit operation.			SC.912.P.10.15
06.71 Inspect and replace exterior and courtesy lamps.			
07.0 Explain and apply proficiently the diagnosis, service and repair of engines, cylinder heads, valve train, lubrication and cooling systems--The student will be able to:			
General			

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
07.01 Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins.	P-1	LAFS.910.RI.1.3; 2.4; 3.7	
07.02 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.		LAFS.910.W.2.6 LAFS.910.L.1.2C	
07.03 Verify operation of the instrument panel engine warning indicator.	P-1		
07.04 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.	P-1		
07.05 Install engine covers using gaskets, seals and sealers as required.	P-1		
07.06 Remove and replace timing belt; verify correct camshaft timing.	P-1		
07.07 Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.	P-1		
07.08 Identify hybrid vehicle internal combustion engine service precautions.	P-3		
<b>Cylinder Head and Valve Train</b>			
07.09 Adjust valves (mechanical or hydraulic lifters).	P-1		
<b>Lubrication and Cooling Systems</b>			
07.10 Perform cooling system pressure and dye test to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core and gallery plugs; determine necessary action.	P-1		SC.912.P.8.8; 10.5
07.11 Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.	P-1		
07.12 Remove, inspect, and replace thermostat and gasket/seal.	P-1		
07.13 Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.	P-1		SC.912.P.8.8
07.14 Perform engine oil and filter change.	P-1		

**Course Title:** Automotive Maintenance and Light Repair 2  
**Course Number:** 9504120  
**Course Credit:** 1

**Course Description:**

The Automotive Maintenance and Light Repair 2 course prepare students for entry into Automotive Maintenance and Light Repair 3. Students study automotive general electrical systems, starting and charging systems, batteries, lighting, and electrical accessories. Content emphasizes beginning transportation service skills and workplace success skills.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science  
 EE = Electrical/Electronic Systems

<b>EE Task List:</b>	
P-1 =	26
P-2 =	8
P-3 =	3
<b>Total</b>	<b>37</b>

<b>CTE Standards and Benchmarks</b>	<b>Priority Number</b>	<b>FS-M/LA</b>	<b>NGSSS-Sci</b>
08.0 Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, and accessory systems--The student will be able to:			
General			
08.01 Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1	LAFS.910.RI.1.3; 2.4; 3.7	
08.02 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.		LAFS.910.W.2.6 LAFS.910.L.1.2C	
08.03 Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).	P-1	MAFS.912.A-CED.1.1, 2, 4	SC.912.P.10.15
08.04 Use wiring diagrams to trace electrical/electronic circuits.	P-1		

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
08.05 Demonstrate the proper use of a digital multimeter (DMM) when measuring source, voltage drop (including grounds), current flow, and resistance.	P-1	MAFS.912.A-CED.1.1, 2, 4	SC.912.P.10.15
08.06 Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.	P-2		SC.912.P.10.15
08.07 Check operation of electrical circuits with a test light.	P-2		
08.08 Check operation of electrical circuits using fused jumper wires.	P-2		
08.09 Measure key-off battery drain (parasitic draw).	P-1		SC.912.P.10.15
08.10 Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.	P-1		SC.912.P.10.15
08.11 Perform solder repair of electrical wiring.	P-1		
08.12 Replace electrical connectors and terminal ends.	P-1		
<b>Battery Service</b>			
08.13 Perform battery state-of-charge test; determine necessary action.	P-1		
08.14 Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.	P-1		
08.15 Maintain or restore electronic memory functions.	P-1		
08.16 Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.	P-1		
08.17 Perform slow/fast battery charge according to manufacturer's recommendations.	P-1		
08.18 Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.	P-1		
08.19 Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions.	P-3		
08.20 Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.	P-1		
08.21 Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures.	P-3		
<b>Starting System</b>			

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
08.22 Perform starter current draw tests; determine necessary action.	P-1	MAFS.912.A-CED.1.1, 2, 4	SC.912.P.10.15
08.23 Perform starter circuit voltage drop tests; determine necessary action.	P-1	MAFS.912.A-CED.1.1, 2, 4	SC.912.P.10.15
08.24 Inspect and test starter relays and solenoids; determine necessary action.	P-2		SC.912.P.10.16, 17
08.25 Remove and install starter in a vehicle.	P-1		
08.26 Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.	P-2		SC.912.P.10.15
<b>Charging System</b>			
08.27 Perform charging system output test; determine necessary action.	P-1	MAFS.912.A-CED.1.1, 2, 4	SC.912.P.10.15
08.28 Inspect, adjust, or replace generator (alternator) drive belts, check pulleys, and tensioners for wear; check pulley and belt alignment.	P-1		
08.29 Remove, inspect, and re-install generator (alternator).	P-2		
08.30 Perform charging circuit voltage drop test; determine necessary action.	P-1	MAFS.912.A-CED.1.1, 2, 4	SC.912.P.10.15
<b>Lighting System</b>			
08.31 Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving light); replace as needed.	P-1		
08.32 Aim headlights.	P-2		
08.33 Identify system voltage and safety precautions associated with high intensity discharge headlights.	P-2		
<b>Accessories</b>			
08.34 Disable and enable airbag system for vehicle service; verify indicator lamp operation.	P-1		
08.35 Remove and reinstall door panel.	P-1		
08.36 Describe the operation of keyless entry/remote-start systems.	P-3	LAFS.910.W.1.2A ,B, C, D, E, F LAFS.910.L.1.2C	
08.37 Verify operation of instrument panel gauges and warning /indicator lights; reset maintenance indicators.	P-1		

<b>CTE Standards and Benchmarks</b>	<b>Priority Number</b>	<b>FS-M/LA</b>	<b>NGSS-Sci</b>
08.38 Verify windshield wiper and washer operation, replace wiper blades.	P-1		

**Course Title:** Automotive Maintenance and Light Repair 3  
**Course Number:** 9504130  
**Course Credit:** 1

**Course Description:**

The Automotive Maintenance and Light Repair 3 course prepare students for entry into Automotive Maintenance and Light Repair 4. Students study and service suspension and steering systems, and brake systems. Content emphasizes beginning transportation service skills and workplace success skills.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science  
 SS = *Suspension and Steering*  
 BR = *Brakes*

<b>SS Task List:</b>	
P-1 =	26
P-2 =	6
P-3 =	2
<b>Total</b>	<b>34</b>

<b>BR Task List:</b>	
P-1 =	26
P-2 =	6
P-3 =	4
<b>Total</b>	<b>36</b>

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSSS-Sci
12.0 Explain and apply proficiently the diagnosis, service and repair of front and rear suspensions systems, wheel alignment, and wheels and tires –The student will be able to:			
General			
12.01 Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1	LAFS.1112.RI.1.3; 2.4; 3.7	
12.02 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.		LAFS.1112.RI.2.4	
12.03 Disable and enable supplemental restraint system (SRS).	P-1		
Suspension and Steering Service			
12.04 Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.	P-1		
12.05 Determine proper power steering fluid type; inspect fluid level and condition.	P-1		SC.912.P.8.2

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
12.06 Flush, fill, and bleed power steering system.	P-2		
12.07 Inspect for power steering fluid leakage; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
12.08 Remove, inspect, replace, and adjust power steering pump drive belt.	P-1		
12.09 Inspect and replace power steering hoses and fittings.	P-2		
12.10 Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.	P-1		
12.11 Inspect tie rod ends (sockets), tie rod sleeves, and clamps.	P-1		
12.12 Inspect upper and lower control arms, bushings, and shafts.	P-1		
12.13 Inspect and replace rebound and jounce bumpers.	P-1		
12.14 Inspect track bar, strut rods/radius arms and related mounts and bushings.	P-1		
12.15 Inspect upper and/or lower ball joints (with or without wear indicators).	P-1		
12.16 Inspect suspension system coil springs and spring insulators (silencers).	P-1		
12.17 Inspect suspension system torsion bars and mounts.	P-1		
12.18 Inspect and replace front stabilizer bar (sway bar) bushings, brackets, and links.	P-1		
12.19 Inspect strut cartridge or assembly.	P-1		
12.20 Inspect front strut coil spring bearing and mount.	P-1		
12.21 Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms.	P-1		
12.22 Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts and mounts.	P-1		
12.23 Inspect, remove, and replace shock absorbers; inspect mounts and bushings.	P-1		
12.24 Inspect electric power-assisted steering.	P-3		

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
12.25 Identify hybrid vehicle power steering system electrical circuits and safety precautions.	P-2	LAFS.1112.RI.1.1	
12.26 Describe the function of the power steering pressure switch.	P-3	LAFS.1112.W.1.2A, B, C, D, E, F; 2.6 LAFS.1112.L.1.2B	
12.27 Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.			
Wheel Alignment			
12.28 Perform pre-alignment inspection and measure vehicle ride height; perform necessary action.	P-1	MAFS.912.G-C0.1.1	
12.29 Identify alignment related symptoms such as wander, drift and pull.			
12.30 Measure front and rear wheel camber; adjust as needed.		MAFS.912.G-C0.1.1	
12.31 Measure caster; adjust as needed.		MAFS.912.G-C0.1.1	
12.32 Measure front wheel toe; adjust as needed.		MAFS.912.G-C0.1.1	
12.33 Center the steering wheel using mechanical methods.			
12.34 Measure rear wheel toe, adjust as needed.		MAFS.912.G-C0.1.1	
12.35 Measure thrust angle.		MAFS.912.G-C0.1.1	
12.36 Calibrate steering angle sensor.			
Wheels and Tires			
12.37 Inspect tire condition; identify tire wear patterns; check of correct tire size and application (load and speed rating) and adjust air pressure; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
12.38 Rotate tires according to manufacturer's recommendations.	P-1		
12.39 Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic).	P-1		
12.40 Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.	P-2		
12.41 Inspect tire and wheel assembly for air loss; perform necessary action.	P-1		

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
12.42 Repair tire using internal patch.	P-1		
12.43 Identify and test pressure monitor system (indirect and direct) for operation; verify operation of instrument panel lambs.	P-2	LAFS.1112.RI.1.1	
12.44 Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system.	P-2		
13.0 Explain and apply proficiently the diagnosis, service and repair of drum\disc brake, hydraulics, power assist units, electronic brakes, and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems--The student will be able to:			
General			
13.01 Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1	LAFS.1112.RI.1.3; 2.4; 3.7	
13.02 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.		LAFS.1112.RI.2.4, 6	
13.03 Describe procedures for performing a road test to check brake system operation; including an antilock brake system (ABS).	P-1	LAFS.1112.SL.2.4, 6	
13.04 Install wheel and torque lug nuts.	P-1	MAFS.912.N-Q.1.1	
Hydraulic System			
13.05 Measure brake pedal height, travel, and free play (as applicable); determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B MAFS.912.N-Q.1.1	
13.06 Check master cylinder for internal/external leaks and proper operation.	P-1		
13.07 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; check for loose fittings and supports; determine necessary action.	P-1		
13.08 Select, handle, store, and fill brake fluids to proper level.	P-1		SC.912.P.8.2
13.09 Identify components of brake warning light system.	P-3	LAFS.1112.RI.1.1	
13.10 Bleed and/or flush brake system.	P-1		

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
13.11 Test brake fluid for contamination.	P-1		SC.912.P.8.2
13.12 Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).			
<b>Drum Brakes</b>			
13.13 Remove, clean, inspect, and measure brake drum diameter; determine necessary action.	P-1	MAFS.912.N-Q.1.1	
13.14 Refinish brake drum and measure final drum diameter; compare with specifications.	P-1	LAFS.1112.RI.1.2 MAFS.912.N-Q.1.1	
13.15 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.	P-1		
13.16 Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.	P-2		
13.17 Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments.	P-2		
<b>Disc Brakes</b>			
13.18 Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
13.19 Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
13.20 Remove, inspect, and replace pads and retaining hardware; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
13.21 Lubricate and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.	P-1		
13.22 Clean and inspect rotor; measure rotor thickness, thickness variation, and lateral run out; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B MAFS.912.N-Q.1.1	
13.23 Remove and reinstall rotor.	P-1		
13.24 Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.	P-1	MAFS.912.N-Q.1.1	
13.25 Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.	P-1	MAFS.912.N-Q.1.1	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
13.26 Retract and re-adjust caliper piston on an integrated parking brake system.	P-3		
13.27 Check brake pad wear indicator; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
13.28 Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.	P-1	LAFS.1112.W.2.4, 6	SC.912.P.10.1
<b>Power-Assist Units</b>			
13.29 Check brake pedal travel with, and without engine running to verify proper power booster operation.	P-2		
13.30 Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.	P-1		
<b>Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.)</b>			
13.31 Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings.	P-1		
13.32 Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.	P-2		
13.33 Check parking brake operation and parking brake indicator light system; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
13.34 Check operation of brake stop light system.	P-1		SC.912.P.10.15
13.35 Replace wheel bearing and race.	P-2		
13.36 Inspect and replace wheel studs.	P-1		
<b>Electronic Brakes, and Traction and Stability Control Systems</b>			
13.37 Identify traction control/vehicle stability control system components.	P-3		
13.38 Describe the operation of a regenerative braking system.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	

**Course Title:** Automotive Maintenance and Light Repair 4  
**Course Number:** 9504140  
**Course Credit:** 1

**Course Description:**

The Automotive Maintenance and Light Repair IV prepare students for entry into the automotive workforce or into post- secondary training. Student's study and service automotive HVAC systems, engine performance systems, automatic and manual transmission/transaxle systems, as well as practice workplace soft skills.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science  
 HA = Heating and Air Conditioning  
 EP = Engine Performance  
 AT = Automatic Transmission/Transaxle  
 MD = Manual Drive Train and Axles

<b>HA Task List:</b> P-1 = 5 P-2 = 2 P-3 = 0 <b>Total</b> 7	<b>EP Task List:</b> P-1 = 12 P-2 = 2 P-3 = 1 <b>Total</b> 15	<b>AT Task List:</b> P-1 = 4 P-2 = 4 P-3 = 2 <b>Total</b> 10	<b>MD Task List:</b> P-1 = 6 P-2 = 6 P-3 = 2 <b>Total</b> 14
---	---	--	--

CTE Standards and Benchmarks		Priority Number	FS-M/LA	NGSSS-Sci
14.0	Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, heating, ventilation, and engine cooling, operating and related control systems--The student will be able to:			
General				
14.01	Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1	LAFS.1112.RI.1.3; 2.4; 3.7	
14.02	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.		LAFS.1112.RI.2.4	
Refrigeration Systems Components				
14.03	Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
14.04 Identify hybrid vehicle A/C system electrical circuits and service/safety precautions.	P-2	LAFS.1112.RI.1.1; 2.4 LAFS.1112.L.1.2B, LAFS.1112.W.2.4	
14.05 Inspect A/C condenser for airflow restrictions; perform necessary action.	P-1		
Heating, Ventilation, and Engine Cooling Systems			
14.06 Inspect engine cooling and heater system hoses; perform necessary action.	P-1		
Operating Systems and Related Controls			
14.07 Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action.	P-1		
14.08 Identify the source of A/C system odors.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
15.0 Explain and apply proficiently the diagnosis, service and repair of engine computerized controls, fuel, air induction, exhaust, and emission control systems --The student will be able to:			
General			
15.01 Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1	LAFS.1112.RI.1.3; 2.4; 3.7	
15.02 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
15.03 Perform cylinder power balance test; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
15.04 Perform cylinder cranking and running compression tests; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
15.05 Perform cylinder leakage test; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
15.06 Verify engine operating temperature; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.12.11
15.07 Remove and replace spark plugs; inspect secondary ignition components for wear and damage.	P-1		
Computerized Controls			
15.08 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	P-1	LAFS.1112.RI.1.2 LAFS.1112.W.2.4	
15.09 Describe the importance of operating all OBDII monitors for repair verification.	P-1	LAFS.1112.RI.2.4	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSSS-Sci
Fuel, Air Induction, and Exhaust Systems			
15.10 Replace fuel filters.	P-1		
15.11 Inspect, service or replace air filters, filter housing and intake duct work.	P-1		
15.12 Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform necessary action.	P-1		
15.13 Inspect condition of exhaust system hangers, brackets, clamps and heat shields; repair or replace as needed.	P-1		
15.14 Check and refill diesel exhaust fluid (DEF).	P-3		SC.912.P.8.2
Emissions Control Systems			
15.15 Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
16.0 Explain and apply proficiently the diagnosis, service, repair and overhaul of in-vehicle and off-vehicle automatic transmissions/transaxles--The student will be able to:			
General			
16.01 Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins.	P-1	LAFS.1112.RI.1.3; 2.4; 3.7	SC.912.P.8.2
16.02 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.		LAFS.1112.RI.2.4	
16.03 Check fluid level in a transmission or a transaxle equipped with a dipstick.	P-1		
16.04 Check fluid level in a transmission or a transaxle not equipped with a dipstick.	P-1		
16.05 Check transmission fluid condition; check for leaks.	P-2		SC.912.P.8.2
In-Vehicle Transmission/Transaxle			
16.06 Inspect, adjust, and replace manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch.	P-2		
16.07 Inspect for leakage at external seals, gaskets, and bushings.	P-2		

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
16.08 Inspect, replace, and align powertrain mounts.	P-2		
16.09 Drain and replace fluids and filter(s).	P-1		
Off-Vehicle Transmission and Transaxle			
16.10 Describe the operational characteristics of a continuously variable transmission (CVT).	P-3	LAFS.1112.W.2.4 LAFS.1112.L.1.2B	
16.11 Describe the operational characteristics of a hybrid vehicle drive train.	P-3	LAFS.1112.W.2.4 LAFS.1112.L.1.2B	
17.0 Explain and apply proficiently the diagnosis, service and repair of manual drivetrain, clutches, transmissions/transaxles, drive and half-shafts, universal and constant velocity joints, differential case assemblies, drive axles, four-wheel and all-wheel drive systems - -The student will be able to:			
General			
17.01 Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.	P-1	LAFS.1112.RI.1.3; 2.4; 3.7	
17.02 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.		LAFS.1112.RI.2.4	
17.03 Drain and refill manual transmission/transaxle and final drive unit.	P-1		
17.04 Check fluid condition; check for leaks.	P-2		SC.912.P.8.2
Clutch			
17.05 Check and adjust clutch master cylinder fluid level.	P-1		
17.06 Check for system leaks.	P-1		
Transmission/Transaxle			
17.07 Describe the operational characteristics of an electronically controlled manual transmission/transaxle.	P-3	LAFS.1112.W.2.4 LAFS.1112.L.1.2B	
Drive Shaft, Half Shafts, Universal and Constant-Velocity (CV) Joints			
17.08 Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals.	P-2		
17.09 Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.	P-2		

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
Differential Case Assembly/Drive Axles			
17.10 Clean and inspect differential housing; check for leaks; inspect housing vent.	P-2		
17.11 Check and adjust differential housing fluid level/condition.	P-1		SC.912.P.8.2
17.12 Drain and refill differential housing.	P-1		
17.13 Inspect and replace drive axle wheel studs.	P-2		
Four-Wheel Drive/All-Wheel Drive			
17.14 Inspect front-wheel bearings and locking hubs.	P-3		
17.15 Check for leaks at drive assembly seals; check vents; check lube level.	P-2		

**Course Title:** Automotive Maintenance and Light Repair 5  
**Course Number:** 9504150  
**Course Credit:** 1

**Course Description:**

The Automotive Maintenance and Light Repair 5 prepare students for entry into the automotive workforce or into post- secondary training. Student's study and service automotive engine repair, electrical/electronic systems, suspension and steering systems, brakes as well as practice workplace soft skills.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science  
 ER = Engine Repair  
 EE = Electrical/Electronics  
 SS = Suspension and Steering  
 BR = Brakes

<b>ER Task List:</b> P-1 = 8 P-2 = 6 P-3 = 2 <b>Total</b> 16	<b>EE Task List:</b> P-1 = 4 P-2 = 9 P-3 = 2 <b>Total</b> 15	<b>SS Task List:</b> P-1 = 7 P-2 = 14 P-3 = 3 <b>Total</b> 24	<b>BR Task List:</b> P-1 = 7 P-2 = 3 P-3 = 5 <b>Total</b> 15
--	--	---	--

CTE Standards and Benchmarks		Priority Number	FS-M/LA	NGSSS-Sci
18.0	Explain and apply proficiently the diagnosis, service and repair of engines, cylinder heads, valve train, engine block, lubrication and cooling systems--The student will be able to:			
General: Engine Diagnosis; Removal and Reinstallation (R & R)				
18.01	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	P-1	LAFS.1112.W.1.2A, B, C, D, E, F; 2.4, 6 LAFS.1112.L.1.1B	
18.02	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.		LAFS.1112.RI.2.4, 6	
18.03	Identify and interpret engine concern; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
18.04	Locate and interpret vehicle and major component identification numbers.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSSS-Sci
18.05 Diagnose engine noises and vibrations; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
18.06 Diagnose the cause of excessive oil consumption, coolant consumption, unusual engine exhaust color and odor; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
18.07 Perform engine vacuum tests; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
18.08 Perform cylinder power balance tests; determine necessary action.			
18.09 Perform cylinder cranking and running compression tests; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
18.10 Perform cylinder leakage tests; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
18.11 Remove and reinstall engine in an OBDII or newer vehicle; reconnect all attaching components and restore the vehicle to running condition.	P-3		
18.12 Inspect, remove and replace engine mounts.	P-2		
<b>Cylinder Head and Valve Train Diagnosis and Repair</b>			
18.13 Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specifications and procedures.	P-1	LAFS.1112.RI.1.1, LAFS.1112.L.3.4A, B, C, D; 3.6	
18.14 Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition.	P-1		
18.15 Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
18.16 Inspect and replace camshaft and drive belt/chain; includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and valve timing components; verify correct camshaft timing.	P-1		
18.17 Establish camshaft position sensor indexing.	P-1		
<b>Engine Block Assembly Diagnosis and Repair</b>			
18.18 Remove, inspect, or replace crankshaft vibration damper (harmonic balancer).	P-2		

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSSS-Sci
18.19 Remove and replace piston pin.			
Lubrication and Cooling Systems Diagnosis and Repair			
18.20 Perform oil pressure tests; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
18.21 Inspect and replace engine cooling and heater system hoses.			
18.22 Inspect, remove and replace water pump.	P-2		
18.23 Remove and replace radiator.	P-2		
18.24 Inspect, and test fans(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.	P-1		
18.25 Inspect auxiliary coolers; determine necessary action.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
18.26 Inspect, test, and replace oil temperature and pressure switches and sensors.	P-2		SC.912.P.10.1, 4
18.27 Identify causes of engine overheating.	P-1	LAFS.1112.RI.1.1	
19.0 Explain and apply proficiently the diagnosis, service and repair of electrical/electronic system components, battery, starting, charging, lighting, gauges, warning devices, driver information, horn, wiper/washer and accessory systems--The student will be able to:			
General: Electrical System Diagnosis			
19.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.		LAFS.1112.W.1.2A, B, C, D, E, F; 2.4, 6 LAFS.1112.L.1.1B	
19.02 Identify and interpret electrical/electronic system concern; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
19.03 Locate and interpret vehicle and major component identification numbers.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
19.04 Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.10.13, 15
19.05 Repair wiring harness.	P-3		
19.06 Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.		LAFS.1112.RI.1.1 LAFS.1112.RL.2.4	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
Battery Diagnosis and Service			
19.07 Perform battery conductance test; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.10.13, 14, 15
Starting System Diagnosis and Repair			
19.08 Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.	P-2		SC.912.P.10.13, 14, 15
Charging System Diagnosis and Repair			
19.09 Diagnose (troubleshoot) charging system for the cause of undercharge, no-charge, and overcharge conditions.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.10.13, 14, 15
Lighting Systems Diagnosis and Repair			
19.10 Diagnose (troubleshoot) the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.10.13, 14, 15
19.11 Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.10.13, 14, 15
Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair			
19.12 Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
19.13 Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
19.14 Diagnose (troubleshoot) the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B MAFS.912.A-CED.1.4	
Horn and Wiper/Washer Diagnosis and Repair			
19.15 Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
19.16 Diagnose (troubleshoot) causes of incorrect horn operation; perform necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
19.17 Diagnose (troubleshoot) causes of incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.10.13, 14, 15
19.18 Diagnose (troubleshoot) windshield washer problems; perform necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
<b>Accessories Diagnosis and Repair</b>			
19.19 Diagnose (troubleshoot) incorrect operation of motor-driven accessory circuits; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.10.13, 14, 15
19.20 Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
19.21 Diagnose (troubleshoot) incorrect electric lock operation (including remote keyless entry); determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
19.22 Diagnose (troubleshoot) incorrect operation of cruise control systems; determine necessary action	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B MAFS.912.A-CED.1.4	SC.912.P.10.13, 14, 15
19.23 Diagnose (troubleshoot) supplemental restraint system (SRS) concerns; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
19.24 Check for module communication (including CAN/BUS systems) using a scan tool.	P-2		
20.0 Explain and apply proficiently the diagnosis, service and repair of front and rear suspension and steering systems, wheel alignment diagnosis and adjustment, and wheels and tires –The student will be able to:			
<b>General: Suspension and Steering Systems</b>			
20.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.		LAFS.1112.W.1.2A, B, C, D, E, F; 2.4, 6 LAFS.1112.L.1.1B	
20.02 Locate and interpret vehicle and major component identification numbers.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
<b>Suspension Systems Diagnosis and Repair</b>			
20.03 Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.04 Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.05 Inspect, remove and install strut rods and bushings.	P-3	LAFS.1112.W.2.4, 6	
20.06 Inspect, remove and install steering knuckle assemblies.	P-3	LAFS.1112.W.2.4, 6	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
Related Suspension and Steering Service			
20.07 Remove, inspect, and service or replace front and rear wheel bearings.	P-1	LAFS.1112.W.2.4, 6	
Wheel Alignment Diagnosis, Adjustment, and Repair			
20.08 Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concern; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.09 Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber and toe as required; center steering wheel.	P-1	MAFS.912.G-CO.1.1	
20.10 Check toe-out-on-turns (turning radius); determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.11 Check SAI (steering axis inclination) and included angle; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.12 Check rear wheel thrust angle; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B MAFS.912.G-CO.1.1	
20.13 Check for front wheel setback; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.14 Check front and/or rear cradle (sub-frame) alignment; determine necessary action.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.15 Reset steering angle sensor.	P-2		
Steering Systems Diagnosis and Repair			
20.16 Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).	P-1		
20.17 Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.18 Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.19 Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; perform necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
20.20 Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.21 Adjust non-rack and pinion worm bearing preload and sector lash.			
20.22 Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.	P-2		
20.23 Remove and reinstall power steering pump.	P-2		
20.24 Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.	P-2		
<b>Wheels and Tires Diagnosis and Repair</b>			
20.25 Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.26 Measure wheel, tire, axle flange, and hub run out; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.27 Diagnose tire pull problems; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
20.28 Reinstall wheel; torque lug nuts.		MAFS.912.N-Q.1.1	
<b>21.0 Explain and apply proficiently the diagnosis, service and repair of drum\disc brake, hydraulics, power assist units, electronic brakes, traction control, stability control systems and miscellaneous (wheel bearings, parking brake, electrical, etc.) systems--The student will be able to:</b>			
<b>General: Brake Systems Diagnosis</b>			
21.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.		LAFS.1112.W.1.2A, B, C, D, E, F; 2.4, 6 LAFS.1112.L.1.2B	
21.02 Identify and interpret brake system concern; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
21.03 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
<b>Hydraulic System Diagnosis and Repair</b>			
21.04 Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).	P-1		
21.05 Remove, bench bleed, and reinstall master cylinder.	P-1		

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
21.06 Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
21.07 Replace brake lines, hoses, fittings, and supports.	P-2		
21.08 Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).	P-2	MAFS.912.G-CO.1.1	
21.09 Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.		LAFS.1112.RI.1.3; 2.4	
21.10 Inspect, test, and/or replace components of brake warning light system.	P-3	LAFS.1112.RI.1.3; 2.4	
<b>Drum Brake Diagnosis and Repair</b>			
21.11 Diagnose poor drum brake stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
21.12 Install wheel, torque lug nuts, and make final checks and adjustments associated with drum brakes.		MAFS.912.N-Q.1.1	
<b>Disc Brake Diagnosis and Repair</b>			
21.13 Diagnose disk brake poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
21.14 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.			
21.15 Install wheel, torque lug nuts, and make final checks and adjustments associated with disc brakes.		MAFS.912.N-Q.1.1	
<b>Power-Assist Units Diagnosis and Repair</b>			
21.16 Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
21.17 Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
21.18 Measure and adjust master cylinder pushrod length.	P-3		
<b>Miscellaneous (Wheel Bearings, Parking Brakes, Electrical) Diagnosis and Repair</b>			

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
21.19 Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
21.20 Remove and reinstall sealed wheel bearing assembly.	P-2		
Electronic Brake, Traction and Stability Control Systems Diagnosis and Repair			
21.21 Identify and inspect electronic brake control system components; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
21.22 Remove and install electronic brake control system electrical/electronic and hydraulic components.			

**Course Title:** Automotive Maintenance and Light Repair 6  
**Course Number:** 9504160  
**Course Credit:** 1

**Course Description:**

The Automotive Maintenance and Light Repair 6 prepare students for entry into the automotive workforce or into post- secondary training. Student's study and service automotive heating and air conditioning, engine performance, automatic transmission/transaxles, manual drive train and axles, as well as practice workplace soft skills.

**Abbreviations:**

FS-M/LA = Florida Standards for Math/Language Arts  
 NGSSS-Sci = Next Generation Sunshine State Standards for Science  
 HA = Heating and Air Conditioning  
 EP = Engine Performance  
 AT = Automatic Transmission/Transaxle  
 MD = Manual Drivetrain and Axles

<b>HA Task List:</b> P-1 = 12 P-2 = 13 P-3 = 4 <b>Total 29</b>	<b>EP Task List:</b> P-1 = 7 P-2 = 10 P-3 = 6 <b>Total 23</b>	<b>AT Task List:</b> P-1 = 5 P-2 = 2 P-3 = 2 <b>Total 9</b>	<b>MD Task List:</b> P-1 = 8 P-2 = 7 P-3 = 2 <b>Total 17</b>
--	---	---	--

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSSS-Sci
22.0 Explain and apply proficiently the diagnosis, service and repair of heating and air conditioning, refrigeration, heating, ventilation, engine cooling, operating and related control systems, refrigerant recovery, and recycling and handling--The student will be able to:			
General: A/C System Diagnosis and Repair			
22.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.		LAFS.1112.W.1.2A, B, C, D, E, F; 2.4, 6 LAFS.1112.L.1.1B	
22.02 Identify and interpret heating and air conditioning problems; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
22.03 Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.		LAFS.1112.RI.2.4	
22.04 Locate and interpret vehicle and major component identification numbers.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSSS-Sci
22.05 Performance test A/C system; identify problems.	P-1		
22.06 Identify abnormal operating noises in the A/C system; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
22.07 Identify refrigerant type; select and connect proper gauge set; record temperature and pressure readings.	P-1	LAFS.1112.W.2.4, 6; 4.10 LAFS.1112.L.1.2B, LAFS.1112.RI.3.7	
22.08 Leak test A/C system; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
22.09 Inspect the condition of refrigerant oil removed from A/C system; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
22.10 Determine recommended oil and oil capacity for system application.	P-1	LAFS.1112.RI.1.1; 2.4; 3.7	SC.912.P.8.1, 2
22.11 Using a scan tool, observe and record related HVAC data and trouble codes.	P-3	LAFS.1112.W.2.4 LAFS.1112.L.1.2B	
<b>Refrigeration System Component Diagnosis and Repair</b>			
22.12 Inspect, test, service or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap; adjust as needed.	P-2		
22.13 Remove, inspect, and reinstall A/C compressor and mountings; determine recommended oil quantity.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
22.14 Determine the need for an additional A/C system filter; perform necessary action.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
22.15 Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
22.16 Remove, inspect, and reinstall receiver/drier or accumulator/drier; determine required oil quantity.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
22.17 Remove, inspect, and install expansion valve or orifice (expansion) tube.	P-1		
22.18 Inspect evaporator housing water drain; perform necessary action.	P-1		
22.19 Determine procedure to remove and reinstall evaporator; determine required oil quantity.	P-2	LAFS.1112.RI.3.7 LAFS.1112.L.3.4C	
<b>Heating, Ventilation, and Engine Cooling Systems Diagnosis and Repair</b>			
22.20 Perform cooling system pressure tests; check coolant condition, inspect and test radiator, cap (pressure/vacuum), coolant recovery tank, and hoses; perform necessary action.			

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSSS-Sci
22.21 Determine procedure to remove, inspect, and reinstall heater core.	P-2		
22.22 Inspect, test, and replace thermostat and gasket/seal.			
22.23 Determine coolant condition and coolant type for vehicle application; drain and recover coolant.			
22.24 Flush system; refill system with recommended coolant; bleed system.			SC.912.P.8.2
22.25 Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action.			
22.26 Inspect and test electric cooling fan, fan control system and circuits; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B MAFS.912.A-CED.1.4	SC.912.P.10.13, 14, 15
22.27 Inspect and test heater control valve(s); perform necessary action.	P-2		
<b>Operating Systems and Related Controls Diagnosis and Repair</b>			
22.28 Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.	P-1	MAFS.912.A-CED.1.4	SC.912.P.10.13, 14, 15
22.29 Diagnose A/C compressor clutch control systems; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B MAFS.912.A-CED.1.4	SC.912.P.10.13, 14, 15
22.30 Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B MAFS.912.A-CED.1.4	SC.912.P.10.13, 14, 15
22.31 Inspect and test A/C-heater control panel assembly; determine necessary action.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B MAFS.912.A-CED.1.4	SC.912.P.10.13, 14, 15
22.32 Inspect and test A/C-heater control cables, motors, and linkages; perform necessary action.	P-3		SC.912.P.10.13, 14, 15
22.33 Identify the source of A/C system odors.	P-2		
22.34 Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.10.13, 14, 15
<b>Refrigerant Recovery, Recycling, and Handling</b>			
22.35 Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards.	P-1		

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSSS-Sci
22.36 Identify and recover A/C system refrigerant.	P-1		
22.37 Recycle, label, and store refrigerant.	P-1		
22.38 Evacuate and charge A/C system; add refrigerant oil as required.	P-1		
23.0 Explain and apply proficiently the diagnosis, service and repair of engines, computerized controls, ignition, fuel, air induction, exhaust, and emission control systems --The student will be able to:			
General: Engine Diagnosis			
23.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.		LAFS.1112.W.1.2A, B, C, D, E, F; 2.4, 6 LAFS.1112.L.1.1B	
23.02 Identify and interpret engine performance concern; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
23.03 Locate and interpret vehicle and major component identification numbers.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2	
23.04 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
23.05 Diagnose abnormal engine noise or vibration concerns; determine necessary action.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
23.06 Diagnose the cause of excessive oil consumption, coolant consumption, unusual exhaust color, odor, and sound; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
23.07 Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.10.13, 14, 15
23.08 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
23.09 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.		LAFS.1112.RI.2.4	SC.912.P.8.2, 8
23.10 Verify correct camshaft timing.	P-1		
Computerized Controls Diagnosis and Repair			

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSSS-Sci
23.11 Check for module communication (including CAN/BUS systems) errors using a scan tool.			
23.12 Access and use service information to perform step-by-step (troubleshooting) diagnosis.	P-1		
23.13 Perform active tests of actuators using a scan tool; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
<b>Ignition System Diagnosis and Repair</b>			
23.14 Diagnose (troubleshoot) ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
23.15 Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action.		LAFS.1112.RI.2.4	SC.912.P.10.13, 14, 15
23.16 Inspect and test crankshaft and camshaft position sensor(s); perform necessary action.	P-1	LAFS.1112.RI.2.4	SC.912.P.10.13, 14, 15
23.17 Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary.	P-3	LAFS.1112.RI.2.4	
<b>Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair</b>			
23.18 Check fuel for contaminants; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.8.2
23.19 Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.	P-1	LAFS.1112.RI.2.4	
23.20 Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.	P-2		
23.21 Inspect and test fuel injectors.	P-2	LAFS.1112.RI.2.4	SC.912.P.10.13, 14, 15
23.22 Verify idle control operation.	P-1		
23.23 Perform exhaust system back-pressure test; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
<b>Emissions Control Systems Diagnosis and Repair</b>			
23.24 Diagnose oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
23.25 Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action.	P-3	LAFS.1112.RI.2.4	
23.26 Inspect, test, service and replace components of the EGR system, including tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.	P-2	LAFS.1112.RI.2.4	
23.27 Inspect and test mechanical components of secondary air injection systems; perform necessary action.		LAFS.1112.RI.2.4	
23.28 Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.	P-3	LAFS.1112.RI.2.4	SC.912.P.10.13, 14, 15
23.29 Inspect and test catalytic converter efficiency.	P-2	LAFS.1112.RI.2.4	SC.912.P.8.2
23.30 Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.	P-1	LAFS.1112.RI.2.4	
23.31 Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action.	P-3	LAFS.1112.RI.2.4	
23.32 Adjust valves on engines with mechanical or hydraulic lifters.			
23.33 Remove and replace timing belt; verify correct camshaft timing.			
23.34 Remove and replace thermostat and gasket/seal.			
23.35 Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.		LAFS.1112.RI.2.4	
23.36 Perform common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert.			
23.37 Perform engine oil and filter change.			
23.38 Identify hybrid vehicle internal combustion engine service precautions.		LAFS.1112.RI.1.1	
24.0 Explain and apply proficiently the diagnosis, service, maintenance, repair and overhaul of in-vehicle and off-vehicle automatic transmissions/transaxles--The student will be able to:			
General: Transmission and Transaxle Diagnosis			

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
24.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.		LAFS.1112.W.1.2A, B, C, D, E, F; 2.4, 6 LAFS.1112.L.1.1B	
24.02 Identify and interpret transmission/transaxle concern, differentiate between engine performance and transmission/transaxle concerns; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
24.03 Locate and interpret vehicle and major component identification numbers.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
24.04 Perform stall test; determine necessary action.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
24.05 Perform lock-up converter system tests; determine necessary action.	P-3	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	SC.912.P.10.13, 14, 15
24.06 Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles.	P-1		
24.07 Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law).	P-2		
<b>In-Vehicle Transmission/Transaxle Maintenance and Repair</b>			
24.08 Inspect, test, adjust, repair, or replace electrical/electronic components and circuits, including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses.	P-1		SC.912.P.10.13, 14, 15
24.09 Diagnose electronic transmission control systems using a scan tool; determine necessary action.		LAFS.1112.RI.2.4	
<b>Off-Vehicle Transmission and Transaxle Repair</b>			
24.10 Remove and reinstall transmission/transaxle and torque converter; inspect engine core plugs, rear crankshaft seal, dowel pins, dowel pin holes, and mating surfaces.	P-1		
24.11 Inspect, leak test, and flush or replace transmission/transaxle oil cooler, lines, and fittings.	P-1		
24.12 Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore.	P-2		
24.13 Install and seat torque converter to engage drive/splines.			
24.14 Inspect bands and drums; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
25.0 Explain and apply proficiently the diagnosis, service and repair of manual drivetrains, clutches, transmissions/transaxles, drive and half-shaft universals, constant velocity joints, ring and pinion gears, differential case assembly, and drive axles- -The student will be able to:			
General: Drive Train Diagnosis			
25.01 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.		LAFS.1112.W.1.2A, B, C, D, E, F; 2.4, 6 LAFS.1112.L.1.1B	
25.02 Identify and interpret drive train concern; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
25.03 Locate and interpret vehicle and major component identification numbers.			
25.04 Diagnose fluid loss, level, and condition concerns; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
Clutch Diagnosis and Repair			
25.05 Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
25.06 Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
25.07 Inspect hydraulic clutch slave and master cylinders, lines, and hoses; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
25.08 Inspect and replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing and linkage, and pilot bearing/bushing (as applicable).	P-1		
25.09 Bleed clutch hydraulic system.	P-1		
25.10 Inspect flywheel and ring gear for wear and cracks; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
25.11 Inspect engine block, core plugs, rear main engine oil seal, clutch (bell) housing, transmission/transaxle case mating surfaces, and alignment dowels; determine necessary action.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
25.12 Measure flywheel run out and crankshaft end play; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
25.13 Remove and reinstall transmission/transaxle.			

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSSS-Sci
Transmission/Transaxle Diagnosis and Repair			
25.14 Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action.			
25.15 Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers.	P-2		
25.16 Inspect, replace, and align powertrain mounts.			
25.17 Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces.			
25.18 Remove and replace transaxle final drive.			
25.19 Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs.			
25.20 Measure end play or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action.			
25.21 Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings.			
25.22 Inspect lubrication devices (oil pump or slingers); perform necessary action.			
25.23 Inspect, test, and replace transmission/transaxle sensors and switches.		LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
Drive Shaft and Half Shaft, Universal and Constant-Velocity (CV) Joint Diagnosis and Repair			
25.24 Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action.	P-1	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B	
25.25 Diagnose universal joint noise and vibration concerns; perform necessary action.	P-2		
25.26 Inspect, service, and replace shaft center support bearings.			
25.27 Check shaft balance and phasing; measure shaft run out; measure and adjust driveline angles.	P-2	MAFS.912.N-Q.1.1	
25.28 Diagnose noise and vibration concerns; determine necessary action.			
Drive Axle Diagnosis and Repair; Ring and Pinion Gears and Differential Case Assembly; Drive Axles			

CTE Standards and Benchmarks	Priority Number	FS-M/LA	NGSS-Sci
25.29 Inspect and replace companion flange and pinion seal; measure companion flange run out.	P-2		
25.30 Inspect and reinstall limited slip differential components.			
25.31 Remove and replace drive axle shafts.	P-1		
25.32 Inspect and replace drive axle shaft seals, bearings, and retainers.	P-2		
25.33 Measure drive axle flange run out and shaft end play; determine necessary action.	P-2	LAFS.1112.W.2.4, 6 LAFS.1112.L.1.2B MAFS.912.N-Q.1.1	
25.34 Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.	P-3		
25.35 Remove and reinstall transfer case.			
25.36 Identify concerns related to variations in tire circumference and/or final drive ratios.	P-3		