

Unit/Standard Number	 <p data-bbox="317 142 600 203">pennsylvania DEPARTMENT OF EDUCATION</p> <p data-bbox="968 175 1583 203"><u>High School Graduation Years 2010, 2011 and 2012</u></p> <p data-bbox="388 261 1528 402">Automobile/Automotive Mechanics Technology/Technician CIP 47.0604 Task Grid</p>	Proficiency Level Achieved: (X) Indicates Competency Achieved to Industry Proficiency Level
	Secondary Competency Task List	
100	ORIENTATION	
101	Explain and follow all lab rules.	
102	Participate in basic shop management.	
103	Participate in parts ordering.	
104	Explain career opportunities.	
105	Demonstrate auto shop safety and hygiene.	
106	Demonstrate the use of service information.	
107	Demonstrate proper telephone courtesy.	
108	Identify vehicle by: sight, V.I.N. and/or ID tag.	
109	Identify career paths within the career and technical education program.	
200	SAFETY	
201	Identify and follow all safety rules.	
202	Demonstrate the ability to secure vehicles on jack stands and hydraulic lifts.	
203	Demonstrate the ability to safely set-up/shut-down oxygen acetylene welding equipment.	
204	Identify chemical safety, "Right-To-Know Laws" and Materials Safety Data Sheets (MSDS).	
205	Identify and demonstrate the safe use of hand tools.	
206	Identify and demonstrate the safe use of power tools.	
207	Identify and demonstrate the safe use of protective clothing and equipment.	
208	Identify and demonstrate the safe use of fire protection equipment.	
209	Identify and demonstrate the safe use of shop equipment.	
210	Explain EPA and OSHA regulations.	
300	TOOLS/FASTENERS	
301	Identify and use fasteners and bolts.	
302	Demonstrate the ability to correctly drill and use re-threading tools.	
303	Demonstrate the ability to correctly read and interpret automotive measuring tools.	
400	CERTIFICATIONS	
401	Obtain PA Safety Inspection Certification.	
402	Obtain EPA 609 Refrigerant Recovery, Recycling Certification.	

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500	SUSPENSION AND STEERING	
501	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
502	Identify and interpret suspension and steering system concerns; determine necessary action.	
503	Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins.	
504	Locate and interpret vehicle and major component identification numbers.	
505	Disable and enable supplemental restraint system (SRS).	
506	Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).	
507	Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.	
508	Adjust non-rack and pinion worm bearing preload and sector lash.	
509	Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.	
510	Inspect and replace rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.	
511	Determine proper power steering fluid type; inspect fluid level and condition.	
512	Flush, fill, and bleed power steering system.	
513	Diagnose power steering fluid leakage; determine necessary action.	
514	Remove, inspect, replace, and adjust power steering pump belt.	
515	Remove and reinstall power steering pump.	
516	Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.	
517	Inspect and replace power steering hoses and fittings.	
518	Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.	
519	Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.	
520	Inspect and test electric power assist steering.	
521	Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action.	
522	Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action.	
523	Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers.	
524	Remove, inspect and install strut rods and bushings.	
525	Remove, inspect, and install upper and/or lower ball joints.	
526	Remove, inspect, and install steering knuckle assemblies.	
527	Remove, inspect, and install short and long arm suspension system coil springs and spring insulators.	
528	Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts.	

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529	Remove, inspect, and install stabilizer bar bushings, brackets, and links.	
530	Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.	
531	Inspect, remove, and replace shock absorbers.	
532	Remove, inspect, and service or replace front and rear wheel bearings.	
533	Describe the function of the idle speed compensation switch.	
534	Lubricate suspension and steering systems.	
535	Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action.	
536	Perform pre-alignment inspection and measure vehicle ride height; perform necessary action.	
537	Prepare vehicle for wheel alignment on the alignment machine; perform four wheel alignment by checking and adjusting front and rear wheel caster, camber; and toe as required; center steering wheel.	
538	Check SAI (steering axis inclination) and included angle; determine necessary action.	
539	Check rear wheel thrust angle; determine necessary action.	
540	Check for front wheel setback; determine necessary action.	
541	Check front and/or rear cradle (subframe) alignment; determine necessary action.	
542	Inspect tire condition; identify tire wear patterns; check and adjust air pressure; determine necessary action.	
543	Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.	
544	Rotate tires according to manufacturer's recommendations.	
545	Measure wheel, tire, axle flange, and hub runout; determine necessary action.	
546	Diagnose tire pull problems; determine necessary action.	
547	Dismount, inspect, and remount tire on wheel; Balance wheel and tire assembly (static and dynamic).	
548	Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.	
549	Reinstall wheel; torque lug nuts.	
550	Inspect tire and wheel assembly for air loss; perform necessary action.	
551	Repair tire using internal patch.	
600	BRAKES	
601	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
602	Identify and interpret brake system concern; determine necessary action.	
603	Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.	
604	Locate and interpret vehicle and major component identification numbers.	

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605	Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).	
606	Measure brake pedal height, travel, and free play (as applicable); determine necessary action.	
607	Check master cylinder for internal/external leaks and proper operation; determine necessary action.	
608	Remove, bench bleed, and reinstall master cylinder.	
609	Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action.	
610	Replace brake lines, hoses, fittings, and supports.	
611	Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).	
612	Select, handle, store, and fill brake fluids to proper level.	
613	Inspect, test, and/or replace components of brake warning light system.	
614	Bleed and/or flush brake system.	
615	Test brake fluid for contamination.	
616	Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.	
617	Remove, clean, inspect, and measure brake drums; determine necessary action.	
618	Refinish brake drum; measure final drum diameter.	
619	Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.	
620	Inspect and install wheel cylinders.	
621	Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings.	
622	Install wheel, torque lug nuts, and make final checks and adjustments.	
623	Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.	
624	Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action.	
625	Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action.	
626	Remove, inspect and replace pads and retaining hardware; determine necessary action.	
627	Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.	
628	Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.	
629	Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action.	
630	Remove and reinstall rotor.	
631	Refinish rotor on vehicle; measure final rotor thickness.	
632	Refinish rotor off vehicle; measure final rotor thickness.	
633	Install wheel, torque lug nuts, and make final checks and adjustments.	
634	Check brake pad wear indicator system operation; determine necessary action.	

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635	Test pedal free travel; check power assist operation.	
636	Check vacuum supply to vacuum-type power booster.	
637	Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action.	
638	Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.	
639	Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings.	
640	Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.	
641	Check parking brake and indicator light system operation; determine necessary action.	
642	Check operation of brake stop light system; determine necessary action.	
643	Replace wheel bearing and race.	
644	Inspect and replace wheel studs.	
645	Remove and reinstall sealed wheel bearing assembly.	
646	Identify and inspect electronic brake control system components; determine necessary action.	
647	Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.	
648	Depressurize high-pressure components of the electronic brake control system.	
649	Bleed the electronic brake control system hydraulic circuits.	
650	Remove and install electronic brake control system electrical/electronic and hydraulic components.	
651	Test, diagnose, and service electronic brake control system speed sensors (digital and analog), 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).	
652	Identify traction control/vehicle stability control system components.	
700	ELECTRICAL/ELECTRONIC SYSTEMS	
701	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
702	Identify and interpret electrical/electronic system concern; determine necessary action.	
703	Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.	
704	Locate and interpret vehicle and major component identification numbers.	
705	Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).	
706	Use wiring diagrams during diagnosis of electrical circuit problems.	
707	Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems, including: source voltage, voltage drop, current flow, and resistance.	

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708	Check electrical circuits with a test light; determine necessary action.	
709	Check electrical circuits using fused jumper wires; determine necessary action.	
710	Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.	
711	Measure and diagnose the cause(s) of excessive parasitic draw; determine necessary action.	
712	Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.	
713	Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.	
714	Remove and replace terminal end from connector; replace connectors and terminal ends.	
715	Repair wiring harness (including CAN/BUS systems).	
716	Perform solder repair of electrical wiring.	
717	Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.	
718	Perform battery state-of-charge test; determine necessary action.	
719	Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action.	
720	Maintain or restore electronic memory functions.	
721	Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps, and hold-downs.	
722	Perform battery charge.	
723	Start a vehicle using jumper cables or an auxiliary power supply.	
724	Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions.	
725	Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect.	
726	Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures.	
727	Perform starter current draw tests; determine necessary action.	
728	Perform starter circuit voltage drop tests; determine necessary action.	
729	Inspect and test starter relays and solenoids; determine necessary action.	
730	Remove and install starter in a vehicle.	
731	Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.	
732	Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.	
733	Perform charging system output test; determine necessary action.	
734	Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.	
735	Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment.	
736	Remove, inspect, and install generator (alternator).	
737	Perform charging circuit voltage drop tests; determine necessary action.	
738	Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.	

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739	Inspect, replace, and aim headlights and bulbs.	
740	Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.	
741	Identify system voltage and safety precautions associated with high intensity discharge headlights.	
742	Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action.	
743	Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.	
744	Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.	
745	Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action.	
746	Diagnose incorrect horn operation; perform necessary action.	
747	Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.	
748	Diagnose incorrect washer operation; perform necessary action.	
749	Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action.	
750	Diagnose incorrect electric lock operation (including remote keyless entry); determine necessary action.	
751	Diagnose supplemental restraint system (SRS) concerns; determine necessary action.	
752	Disarm and enable the airbag system for vehicle service.	
753	Remove and reinstall door panel.	
754	Describe the operation of keyless entry/remote-start systems.	
800	ENGINE PERFORMANCE	
801	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	
802	Identify and interpret engine performance concern; determine necessary action.	
803	Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins.	
804	Locate and interpret vehicle and major component identification numbers.	
805	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.	
806	Diagnose abnormal engine noise or vibration concerns; determine necessary action.	
807	Diagnose abnormal exhaust color, odor, and sound; determine necessary action.	
808	Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.	
809	Perform cylinder power balance test; determine necessary action.	
810	Perform cylinder cranking and running compression tests; determine necessary action.	
811	Perform cylinder leakage test; determine necessary action.	
812	Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.	
813	Verify engine operating temperature; determine necessary action.	

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814	Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.	
815	Verify correct camshaft timing.	
816	Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.	
817	Diagnose the causes of emissions or drivability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data.	
818	Diagnose emissions or drivability concerns without stored diagnostic trouble codes; determine necessary action.	
819	Inspect and test computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action.	
820	Access and use service information to perform step-by-step diagnosis.	
821	Perform active tests of actuators using a scan tool; determine necessary action.	
822	Describe the importance of running all OBDII monitors for repair verification.	
823	Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor drivability, spark knock, power loss, poor mileage, and emissions concerns; determine necessary action.	
824	Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action.	
825	Inspect and test crankshaft and camshaft position sensor(s); perform necessary action.	
826	Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary.	
827	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; determine necessary action.	
828	Check fuel for contaminants and quality; determine necessary action.	
829	Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.	
830	Replace fuel filters.	
831	Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.	
832	Inspect and test fuel injectors.	
833	Verify idle control operation.	
834	Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action.	
835	Perform exhaust system back-pressure test; determine necessary action.	
836	Diagnose oil leaks, emissions, and drivability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action.	
837	Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.	

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838	Diagnose emissions and drivability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action.	
839	Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.	
840	Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.	
841	Inspect and test mechanical components of secondary air injection systems; perform necessary action.	
842	Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.	
843	Inspect and test catalytic converter efficiency.	
844	Diagnose emissions and drivability concerns caused by the evaporative emissions control system; determine necessary action.	
845	Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.	
846	Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action.	
847	Adjust valves on engines with mechanical or hydraulic lifters.	
848	Remove and replace timing belt; verify correct camshaft timing.	
849	Remove and replace thermostat and gasket/seal.	
850	Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.	
851	Perform common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert.	
852	Perform engine oil and filter change.	
853	Identify hybrid vehicle internal combustion engine service precautions.	