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| Unit/Standard Number |  pennsylvania DEPARTMENT OF EDUCATION | <u>High School Graduation Years 2013, 2014 and 2015</u> |
| | Automobile/Automotive Mechanics Technology/Technician CIP 47.0604 Task Grid | |
| | 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 | Demonstrate auto shop safety and hygiene. | |
| 105 | Demonstrate the use of service information. | |
| 106 | Demonstrate proper telephone courtesy. | |
| 107 | Identify vehicle by: sight, V.I.N. and/or ID tag. | |
| 108 | Identify career paths within the career and technical education program. | |
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| 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. | |
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| 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 precision automotive measuring tools. | |
| 304 | Demonstrate the ability to correctly use automotive tools. | |
| 305 | Perform common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert. | |
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| 400 | CERTIFICATIONS | |
| 401 | Prepare to obtain PA Safety Inspection Certification. | |
| 402 | Prepare to obtain EPA 609 Refrigerant Recovery, Recycling Certification. | |


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| | 403 Prepare to obtain Emission Inspection Certification. |
| 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 | Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets. |
| 508 | Inspect and replace rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. |
| 509 | Determine proper power steering fluid type; inspect fluid level and condition. |
| 510 | Flush, fill, and bleed power steering system. |
| 511 | Diagnose power steering fluid leakage; determine necessary action. |
| 512 | Remove, inspect, replace, and adjust power steering pump belt. |
| 513 | Remove and reinstall power steering pump. |
| 514 | Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment. |
| 515 | Inspect and replace power steering hoses and fittings. |
| 516 | Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. |
| 517 | Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps. |
| 518 | Inspect and test electric power assist steering. |
| 519 | Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers. |
| 520 | Remove, inspect and install strut rods and bushings. |
| 521 | Remove, inspect, and install upper and/or lower ball joints. |
| 522 | Remove, inspect, and install steering knuckle assemblies. |
| 523 | Remove, inspect, and install short and long arm suspension system coil springs and spring insulators. |
| 524 | Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts. |
| 525 | Remove, inspect, and install stabilizer bar bushings, brackets, and links. |
| 526 | Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount. |
| 527 | Inspect, remove, and replace shock absorbers. |
| 528 | Remove, inspect, and service or replace front and rear wheel bearings. |
| 529 | Lubricate suspension and steering systems. |


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| 530 | Perform pre-alignment inspection and measure vehicle ride height; perform necessary action. | |
| 531 | 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. | |
| 532 | Check SAI (steering axis inclination) and included angle; determine necessary action. | |
| 533 | Check rear wheel thrust angle; determine necessary action. | |
| 534 | Check for front wheel setback; determine necessary action. | |
| 535 | Check front and/or rear cradle (subframe) alignment; determine necessary action. | |
| 536 | Inspect tire condition; identify tire wear patterns; check and adjust air pressure; determine necessary action. | |
| 537 | Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action. | |
| 538 | Rotate tires according to manufacturer's recommendations. | |
| 539 | Measure wheel, tire, axle flange, and hub runout; determine necessary action. | |
| 540 | Diagnose tire pull problems; determine necessary action. | |
| 541 | Dismount, inspect, and remount tire on wheel; Balance wheel and tire assembly (static and dynamic). | |
| 542 | Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor. | |
| 543 | Reinstall wheel; torque lug nuts. | |
| 544 | Inspect tire and wheel assembly for air loss; perform necessary action. | |
| 545 | 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. | |
| 605 | Measure brake pedal height, travel, and free play (as applicable); determine necessary action. | |
| 606 | Check master cylinder for internal/external leaks and proper operation; determine necessary action. | |
| 607 | Remove, bench bleed, and reinstall master cylinder. | |
| 608 | Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action. | |
| 609 | Replace brake lines, hoses, fittings, and supports. | |
| 610 | Fabricate brake lines using proper material and flaring procedures (double flare and ISO types). | |
| 611 | Select, handle, store, and fill brake fluids to proper level. | |
| 612 | Inspect, test, and/or replace components of brake warning light system. | |
| 613 | Bleed and/or flush brake system. | |

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| 614 | Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. | |
| 615 | Remove, clean, inspect, and measure brake drums; determine necessary action. | |
| 616 | Refinish brake drum; measure final drum diameter. | |
| 617 | Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. | |
| 618 | Inspect and install wheel cylinders. | |
| 619 | Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings. | |
| 620 | Install wheel, torque lug nuts, and make final checks and adjustments. | |
| 621 | Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action. | |
| 622 | Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action. | |
| 623 | Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action. | |
| 624 | Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks. | |
| 625 | Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action. | |
| 626 | Remove and reinstall rotor. | |
| 627 | Refinish rotor on vehicle; measure final rotor thickness. | |
| 628 | Refinish rotor off vehicle; measure final rotor thickness. | |
| 629 | Install wheel, torque lug nuts, and make final checks and adjustments. | |
| 630 | Check brake pad wear indicator system operation; determine necessary action. | |
| 631 | Test pedal free travel; check power assist operation. | |
| 632 | Check vacuum supply to vacuum-type power booster. | |
| 633 | Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings. | |
| 634 | Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed. | |
| 635 | Check parking brake and indicator light system operation; determine necessary action. | |
| 636 | Check operation of brake stop light system; determine necessary action. | |
| 637 | Replace wheel bearing and race. | |
| 638 | Inspect and replace wheel studs. | |
| 639 | Remove and reinstall sealed wheel bearing assembly. | |
| 640 | Identify and inspect electronic brake control system components; determine necessary action. | |
| 641 | Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action. | |
| 642 | Depressurize high-pressure components of the electronic brake control system. | |
| 643 | Bleed the electronic brake control system hydraulic circuits. | |
| 644 | Identify traction control/vehicle stability control system components. | |
| 700 | ELECTRICAL/ELECTRONIC SYSTEMS | |

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| 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 | Use wiring diagrams during diagnosis of electrical circuit problems. | |
| 706 | Check electrical circuits with a test light; determine necessary action. | |
| 707 | Check electrical circuits using fused jumper wires; determine necessary action. | |
| 708 | Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action. | |
| 709 | Measure and diagnose the cause(s) of excessive parasitic draw; determine necessary action. | |
| 710 | Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. | |
| 711 | Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action. | |
| 712 | Remove and replace terminal end from connector; replace connectors and terminal ends. | |
| 713 | Repair wiring harness (including CAN/BUS systems). | |
| 714 | Perform solder repair of electrical wiring. | |
| 715 | Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures. | |
| 716 | Perform battery state-of-charge test; determine necessary action. | |
| 717 | Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action. | |
| 718 | Maintain or restore electronic memory functions. | |
| 719 | Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps, and hold-downs. | |
| 720 | Perform battery charge. | |
| 721 | Start a vehicle using jumper cables or an auxiliary power supply. | |
| 722 | Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect. | |
| 723 | Perform starter current draw tests; determine necessary action. | |
| 724 | Perform starter circuit voltage drop tests; determine necessary action. | |
| 725 | Inspect and test starter relays and solenoids; determine necessary action. | |
| 726 | Remove and install starter in a vehicle. | |
| 727 | Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action. | |
| 728 | Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition. | |
| 729 | Perform charging system output test; determine necessary action. | |
| 730 | Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions. | |
| 731 | Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment. | |

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| 732 | Remove, inspect, and install generator (alternator). | |
| 733 | Perform charging circuit voltage drop tests; determine necessary action. | |
| 734 | Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action. | |
| 735 | Inspect, replace, and aim headlights and bulbs. | |
| 736 | Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action. | |
| 737 | Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action. | |
| 738 | Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action. | |
| 739 | Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. | |
| 740 | Diagnose incorrect horn operation; perform necessary action. | |
| 741 | Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action. | |
| 742 | Diagnose incorrect washer operation; perform necessary action. | |
| 743 | Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. | |
| 745 | Disarm and enable the airbag system for vehicle service. | |
| 746 | Remove and reinstall door panel. | |
| 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. | |
| 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. | |

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| 817 | Diagnose the causes of emissions or drivability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data. | |
| 818 | Access and use service information to perform step-by-step diagnosis. | |
| 819 | Perform active tests of actuators using a scan tool; determine necessary action. | |
| 820 | Describe the importance of running all OBDII monitors for repair verification. | |
| 821 | 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. | |
| 822 | Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action. | |
| 823 | Inspect and test crankshaft and camshaft position sensor(s); perform necessary action. | |
| 824 | Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary. | |
| 825 | 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. | |
| 826 | Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action. | |
| 827 | Replace fuel filters. | |
| 828 | Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air. | |
| 829 | Inspect and test fuel injectors. | |
| 830 | Verify idle control operation. | |
| 831 | 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. | |
| 832 | Diagnose oil leaks, emissions, and drivability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action. | |
| 833 | Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action. | |
| 834 | Diagnose emissions and drivability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action. | |
| 835 | Inspect, test, service and replace component components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action. | |
| 836 | Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action. | |
| 837 | Inspect and test mechanical components of secondary air injection systems; perform necessary action. | |
| 838 | Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action. | |
| 839 | Inspect and test catalytic converter efficiency. | |
| 840 | Diagnose emissions and drivability concerns caused by the evaporative emissions control system; determine necessary action. | |
| 841 | Inspect and test components and hoses of the evaporative emissions control system; perform necessary action. | |
| 842 | Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action. | |
| 843 | Remove and replace timing belt; verify correct camshaft timing. | |
| 844 | Remove and replace thermostat and gasket/seal. | |
| 845 | Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action. | |

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| 846 | Perform engine oil and filter change. |