

| Unit/Standard Number                  | <p style="text-align: right;"><u>High School Graduation Years 2020, 2021 and 2022</u></p> <p style="text-align: center;"><b>Vehicle Maintenance Technology/Other<br/>CIP 47.0699<br/>Task Grid</b></p> | <p style="text-align: center;"><b>Proficiency Level<br/>Achieved:<br/>(X) Indicates<br/>Competency<br/>Achieved to Industry<br/>Proficiency Level</b></p> |
|---------------------------------------|--|---|
| <b>Secondary Competency Task List</b> |  |   |
| <b>100</b>                            | <b>WORKPLACE SAFETY</b>  |   |
| 101                                   | Interpret SDS Sheets.  |   |
| 102                                   | Lift and move heavy objects.   |   |
| 103                                   | Handle and store flammable materials and toxic substances.   |   |
| 104                                   | Follow OSHA rules and regulations.   |   |
| 105                                   | Identify job-site hazards.   |   |
| 106                                   | Wear personal protective equipment (safety goggles, hearing protection and respiratory protection).  |   |
| 107                                   | Select appropriate fire extinguisher according to fire type.   |   |
| 108                                   | Follow safety rules for ECP (Exposure Control Procedures) for blood borne pathogens.   |   |
| 109                                   | Use safe work habits while working with electrical systems.  |   |
|                                       |  |   |
| <b>200</b>                            | <b>BASIC ELECTRICAL PRINCIPLES AND CIRCUIT TESTING</b>   |   |
| 201                                   | RESERVED   |   |
| 202                                   | Interpret electrical circuit and wiring diagrams.  |   |
| 203                                   | Use a meter to measure resistance, continuity, amperage and voltage.   |   |
| 204                                   | Solve problems using Ohm's Law.  |   |
| 205                                   | Follow proper procedure for battery disposal.  |   |
| 206                                   | Construct and test series and parallel circuits.   |   |
| 207                                   | Identify electrical terminals and connectors.  |   |
| 208                                   | Perform a diode test.  |   |
| 209                                   | RESERVED   |   |
| 210                                   | RESERVED   |   |
| 211                                   | RESERVED   |   |
| 212                                   | Inspect, test and replace fusible links, fuses and circuit breakers.   |   |
| 213                                   | Identify American Wire Gauge (AWG) wiring codes.   |   |
| 214                                   | RESERVED   |   |
| 215                                   | Solder a current carrying wire.  |   |
|                                       |  |   |
| <b>300</b>                            | <b>COOLING SYSTEMS</b>   |   |
| 301                                   | Explain the concept of heat transfer and the purpose of a cooling system.  |   |
| 302                                   | Perform a cooling system flush on a liquid cooled engine.  |   |
| 303                                   | Remove, service and replace a water pump, hoses and thermostat.  |   |
| 304                                   | Identify and describe the components of a liquid cooled engine.  |   |
| 305                                   | Pressure-test a liquid-cooled cooling system.  |   |

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|----------------------|--|---|
| 306                  | Identify causes of engine overheating.   |   |
| 307                  | Inspect the cooling system for debris, leaks and damage.   |   |
| <b>400</b>           | <b>FUEL SYSTEMS</b>  |   |
| 401                  | Identify the types of fuel systems and explain the function of each components.  |   |
| 402                  | RESERVED   |   |
| 403                  | Identify types of carburetor designs and their functions.  |   |
| 404                  | RESERVED   |   |
| 405                  | Describe the operation of the idle fuel circuit and the main fuel circuit.   |   |
| 406                  | Explain the "venturi" principle, and variable venturi carburetors.   |   |
| 407                  | Describe fuel enrichment devices.  |   |
| 408                  | RESERVED   |   |
| 409                  | RESERVED   |   |
| 410                  | Identify the function of electronic fuel injection (EFI) components.   |   |
| 411                  | Identify the function, and components of gaseous fuel systems.   |   |
| 412                  | Identify types and grades of fuels used in internal combustion engines   |   |
| 413                  | Describe how fuel additives protect fuel systems.  |   |
| 414                  | Remove, service and replace carburetor.  |   |
| 415                  | RESERVED   |   |
| 416                  | Remove, service, and replace a fuel system's air filter and air intake assembly.   |   |
| 417                  | Remove, service and replace a fuel pump.   |   |
| 418                  | Install and adjust throttle and choke linkage.   |   |
| 419                  | Adjust carburetor mixture screws per OEM specifications.   |   |
| 420                  | Adjust carburetor float level and metering levers.   |   |
| 421                  | Remove, service and replace a fuel tank, filters, caps and lines.  |   |
| 422                  | RESERVED   |   |
| 423                  | Check the fuel pump pressure and flow rate.  |   |
| 424                  | Pressure test the carburetor.  |   |
| 425                  | Check the engine for proper starting, idle and acceleration.   |   |
| 426                  | RESERVED   |   |
| 427                  | RESERVED   |   |
| 428                  | Remove and replace an intake manifold.   |   |
| 429                  | Remove, service and replace EFI fuel system components.  |   |
| 430                  | Diagnose EFI system failures.  |   |
| 431                  | Test and replace an antibackfire/fuel shutoff solenoid.  |   |

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|                      |  |   |
| <b>500</b>           | <b>EXHAUST SYSTEMS</b>   |   |
| 501                  | Identify equipment problems that can occur from operating equipment with a removed or damaged exhaust system.  |   |
| 502                  | RESERVED   |   |
| 503                  | Remove, service and replace a spark arrestor screen.   |   |
| 504                  | Identify exhaust system components and their functions.  |   |
| 505                  | Explain the function of a single stage catalyst (catalytic converters).  |   |
| 506                  | RESERVED   |   |
| 507                  | Remove, service and replace an exhaust system.   |   |
| 508                  | RESERVED   |   |
|                      |  |   |
| <b>600</b>           | <b>MEASURING AND TRADE RELATED MATHEMATICS</b>   |   |
| 601                  | Read a standard and a metric ruler   |   |
| 602                  | Read and use a standard and metric micrometer  |   |
| 603                  | Read and use a standard and metric dial indicator  |   |
| 604                  | Use a standard and metric torque wrench  |   |
| 605                  | Use a standard/metric dial caliper.  |   |
| 606                  | Calculate displacement and horse power.  |   |
| 607                  | Calculate work, power, torque, area and volume.  |   |
|                      |  |   |
| <b>700</b>           | <b>HAND AND POWER TOOLS</b>  |   |
| 701                  | Use common hand tools used in the repair of outdoor power equipment.   |   |
| 702                  | Use specialty tools used in the repair of outdoor power equipment.   |   |
| 703                  | Use electric, air and hydraulic tools.   |   |
|                      |  |   |
| <b>800</b>           | <b>FASTENERS</b>   |   |
| 801                  | Identify, select and install various fasteners according to specifications.  |   |
| 802                  | Replace damaged internal threads using a thread repair system.   |   |
| 803                  | Repair damaged threads, using a tap and die, chaser or a thread file.  |   |
| 804                  | Use a thread extraction tool to remove a broken fastener.  |   |
| 805                  | Torque fasteners according to manufacturer's specifications.   |   |
|                      |  |   |
| <b>900</b>           | <b>WELDING, HEATING AND CUTTING</b>  |   |
| 901                  | Follow safety rules for welding and cutting equipment.   |   |
| 902                  | RESERVED   |   |

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| 903                  | Adjust welding amperage and perform various welding repairs.   |   |
| 904                  | RESERVED   |   |
| 905                  | Light and adjust the flame on an Oxy-Acetylene torch.  |   |
| 906                  | Heat and cut with an oxy-acetylene torch.  |   |
| 907                  | Set up and adjust gauges on welding, heating and cutting equipment.  |   |
| <b>1000</b>          | <b>2-STROKE CYCLE ENGINE</b>   |   |
| 1001                 | Diagnose performance problems in a 2-cycle gasoline engine   |   |
| 1002                 | RESERVED   |   |
| 1003                 | Perform top end compression test.  |   |
| 1004                 | Perform crankcase vacuum/pressure test.  |   |
| 1005                 | Identify the component parts in a short block of a 2-cycle engine and explain their purposes.  |   |
| 1006                 | Pressure test a 2-stroke cycle fuel system.  |   |
| 1007                 | Explain 2- cycle engine operating theory.  |   |
| 1008                 | RESERVED   |   |
| 1009                 | RESERVED   |   |
| 1010                 | Identify the types of 2-stroke cycle valves.   |   |
| 1011                 | Inspect and service 2-stroke cycle exhaust systems.  |   |
| 1012                 | RESERVED   |   |
| <b>1100</b>          | <b>4-STROKE CYCLE ENGINE</b>   |   |
| 1101                 | Disassemble, clean and identify engine components.   |   |
| 1102                 | RESERVED   |   |
| 1103                 | Explain 4-cycle engine operating theory.   |   |
| 1104                 | RESERVED   |   |
| 1105                 | Inspect shaft(s) bearings and gears.   |   |
| 1106                 | RESERVED   |   |
| 1107                 | Measure crankshaft end play and run-out, and repair crankshaft if damaged.   |   |
| 1108                 | Inspect and service valve train components.  |   |
| 1109                 | RESERVED   |   |
| 1110                 | RESERVED   |   |
| 1111                 | RESERVED   |   |
| 1112                 | Install valve springs using a valve spring compressor.   |   |
| 1113                 | Adjust valve clearances/lash.  |   |
| 1114                 | Measure cylinder bore for oversize, out of round, taper and piston to cylinder wall clearance.   |   |

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| 1115                 | Deglaze/hone a cylinder.   |   |
| 1116                 | Perform a cylinder balance test.   |   |
| 1117                 | Perform a cylinder compression test.   |   |
| 1118                 | Perform a cylinder leak-down test.   |   |
| 1119                 | Install a crankshaft, and bearings.  |   |
| 1120                 | Install a piston using a ring compressor.  |   |
| 1121                 | Check ring end gap and side clearance.   |   |
| 1122                 | Verify camshaft timing.  |   |
| 1123                 | Install all gaskets and seals where needed, according to specifications.   |   |
| 1124                 | RESERVED   |   |
| 1125                 | RESERVED   |   |
| 1126                 | RESERVED   |   |
|                      |  |   |
| <b>1200</b>          | <b>ENGINE FAILURE ANALYSIS</b>   |   |
| 1201                 | List engine failure categories.  |   |
| 1202                 | Identify insufficient lubrication failures.  |   |
| 1203                 | Identify fuel system failures.   |   |
| 1204                 | Identify cooling system failures.  |   |
| 1205                 | Identify detonation and pre-ignition failures.   |   |
| 1206                 | RESERVED   |   |
| 1207                 | Identify the effects of over speeding.   |   |
| 1208                 | Identify the signature "breakage" of a connecting rod.   |   |
| 1209                 | Identify exhaust port piston scoring and large end bearings failure on a 2-Stroke cycle engine.  |   |
| 1210                 | Identify the effects of excessing vibration on engine block and mounting base.   |   |
| 1211                 | RESERVED   |   |
|                      |  |   |
| <b>1300</b>          | <b>STARTING SYSTEMS</b>  |   |
| 1301                 | Disassemble, identify and describe the parts of a recoil starting system.  |   |
| 1302                 | RESERVED   |   |
| 1303                 | Replace a starter spring, pulley and starter rope.   |   |
| 1304                 | RESERVED   |   |
| 1305                 | Troubleshoot and repair a starting / safety interlock circuit.   |   |
| 1306                 | Remove, service and replace a Direct Current starter.  |   |
| 1307                 | Remove, service and replace and Alternating Current starter.   |   |
| 1308                 | Identify and describe the components of a DC starting system.  |   |

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| 1309                 | Perform a 12-volt DC starter motor current draw test.  |   |
| 1310                 | Remove, test and replace a starter relay or solenoid.  |   |
|                      |  |   |
| <b>1400</b>          | <b>IGNITION SYSTEM</b>   |   |
| 1401                 | Identify, remove, service and replace battery ignition system components   |   |
| 1402                 | Identify, remove, service and replace electronic ignition system components.   |   |
| 1403                 | RESERVED   |   |
| 1404                 | Check and set ignition timing/air gap.   |   |
| 1405                 | RESERVED   |   |
| 1406                 | Test an ignition system using a spark tester.  |   |
| 1407                 | Inspect the engine for a sheared flywheel key.   |   |
| 1408                 | Remove, inspect and replace points and condenser.  |   |
| 1409                 | RESERVED   |   |
| 1410                 | Replace a spark plug terminal and boot.  |   |
| 1411                 | Test the solid-state transistor-controlled discharge system.   |   |
| 1412                 | Test a capacitive discharge ignition system.   |   |
| 1413                 | RESERVED   |   |
| 1414                 | Perform timing procedures on an engine with a solid state/ electronic ignition system.   |   |
| 1415                 | RESERVED   |   |
| 1416                 | Replace an engine ignition kill switch.  |   |
|                      |  |   |
| <b>1500</b>          | <b>CHARGING SYSTEMS</b>  |   |
| 1501                 | Explain battery theory and perform maintenance and storage procedures.   |   |
| 1502                 | Identify and describe the function of charging system components.  |   |
| 1503                 | Perform a current draw test.   |   |
| 1504                 | Test and troubleshoot the components of a charging system  |   |
| 1505                 | RESERVED   |   |
| 1506                 | RESERVED   |   |
| 1507                 | RESERVED   |   |
| 1508                 | Remove and replace charging system components.   |   |
|                      |  |   |
| <b>1600</b>          | <b>LUBRICATION SYSTEM</b>  |   |
| 1601                 | RESERVED   |   |
| 1602                 | RESERVED   |   |
| 1603                 | Change engine oil and filter on a variety of equipment.  |   |

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|----------------------|--|---|
| 1604                 | Select proper oil and grade utilizing application charts.  |   |
| 1605                 | Prepare a fuel/oil mixture for a 2-Stroke cycle engine.  |   |
| 1606                 | Service a crankcase breather assembly.   |   |
| 1607                 | Describe lubrication systems and their functions.  |   |
| 1608                 | Interpret API oil ratings and SAE viscosity ratings.   |   |
| 1609                 | Describe the standard classification of 2-cycle oils.  |   |
| 1610                 | List common oil contaminants.  |   |
| 1611                 | Describe differences between splash lubrication systems and a pressure lubrication system.   |   |
| 1612                 | Describe the operation of various oil filtration system.   |   |
| 1613                 | Describe methods of checking the oil level in an engine.   |   |
| 1614                 | RESERVED   |   |
| 1615                 | Identify the components and function of a crankcase ventilation breather assembly  |   |
| 1616                 | Perform an oil pressure test.  |   |
| 1617                 | Inspect a low-oil alert system.  |   |
|                      |  |   |
| <b>1700</b>          | <b>GOVERNOR SYSTEMS</b>  |   |
| 1701                 | Perform static and dynamic governor adjustments.   |   |
| 1702                 | Remove, service, and replace pneumatic and mechanical governor.  |   |
| 1703                 | Check top no-load speed adjust governor as needed.   |   |
| 1704                 | Differentiate hunting/surging symptom between the fuel system and governor system.   |   |
|                      |  |   |
| <b>1800</b>          | <b>BRAKE SYSTEMS</b>   |   |
| 1801                 | Inspect, remove, service and repair mechanical brake systems.  |   |
| 1802                 | Inspect, remove, service and repair hydraulic brake systems.   |   |
| 1803                 | Inspect, remove service and repair drum and disc brakes.   |   |
| 1804                 | Explain hydraulic brake theory.  |   |
| 1805                 | RESERVED   |   |
|                      |  |   |
| <b>1900</b>          | <b>CLUTCH AND DRIVE SYSTEM</b>   |   |
| 1901                 | Inspect, service or replace belts and tensioning devices.  |   |
| 1902                 | Inspect, service or replace centrifugal clutches.  |   |
| 1903                 | Inspect, service or replace clutch discs.  |   |
| 1904                 | Inspect, service or replace sprockets and chains.  |   |
| 1905                 | Inspect, service or replace an electric power take-off.  |   |
| 1906                 | Inspect, service or replace universal joints.  |   |

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| 1907                 | Disassemble, service and reassemble gearboxes and components   |   |
| 1908                 | Disassemble, service and reassemble transaxles.  |   |
| 1909                 | Disassemble, service and reassemble hydrostatic drives.  |   |
| 1910                 | Change hydraulic fluid and filter.   |   |
|                      |  |   |
| <b>2000</b>          | <b>PARTS MANAGEMENT, INVOICING AND RECORDKEEPING</b>   |   |
| 2001                 | Interpret illustrations, graphs, diagrams, and tables.   |   |
| 2002                 | Use reference materials, service manuals, and parts tables.  |   |
| 2003                 | Perform inventory of parts in stock.   |   |
| 2004                 | Locate parts and specifications using a computerized or microfiche parts reference database.   |   |
| 2005                 | Complete a service order/invoice form.   |   |
| 2006                 | Interpret time and flat rate information.  |   |
| 2007                 | Order materials and supplies.  |   |
| 2008                 | Explain a manufacturer's model number, serial number, engine type number and Vehicle Identification numbers (VIN).   |   |
|                      |  |   |
| <b>2100</b>          | <b>WHEELS AND CHASSIS SERVICE</b>  |   |
| 2101                 | Remove, replace or repair tubeless tire and valve stem.  |   |
| 2102                 | Remove, replace or repair a tube type tire.  |   |
| 2103                 | Service and replace wheel bearings and bushings.   |   |
| 2104                 | Inspect, service and replace steering components.  |   |
| 2105                 | Inspect, service and repair chassis.   |   |