**USD #380**

**AGRICULTURE, FOOD & NATURAL RESOURCES CAREER CLUSTER DESIGN:**

**Power, Structural & Technical Systems Pathway**

***CHECKLIST*:** ***Small Gasoline Engines* (18410)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Standard** | **Dates Taught** | | | | **Notes** |
| **Career Option in Small Gas Engines** | | | | | |
| 1. Identify several career opportunities in the small gas engine field. |  |  |  |  |  |
| 1. List the qualities that are essential for anyone pursuing a career in small engines. |  |  |  |  |  |
| 1. List the advantage and disadvantages of entrepreneurship. |  |  |  |  |  |
| 1. Identify the benefits of outdoor power equipment certification. |  |  |  |  |  |
| 1. Complete a personal information sheet. |  |  |  |  |  |
| **Safety in the Small Gas Engine Shop** | | | | | |
| 1. Explain why a clean, well organized shop is extremely important. |  |  |  |  |  |
| 1. List dangers associated with working in a small engine shop. |  |  |  |  |  |
| 1. Explaiin the importance of maintaining and using tools properly. |  |  |  |  |  |
| 1. Describe methods for minimizing the risks involved inworking with small engines. |  |  |  |  |  |
| 1. Explain the functions of OSHA. |  |  |  |  |  |
| 1. Complete a Shop Safety Contract/Release form. |  |  |  |  |  |
| 1. Demonstrate knowledge of basic shop safety by satisfactorily completing Safety Orientation Exam. |  |  |  |  |  |

|  |  |  |  |  |  |
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| **Tools and Measuring Instruments** | | | | | |
| 1. Explain why quality tools and measuring instruments should be used when servicing small gas engines. |  |  |  |  |  |
| 1. Use common hand tools properly. |  |  |  |  |  |
| 1. Summarize the reasons that small engine components must be measured carefully. |  |  |  |  |  |
| 1. Demonstrate several of the common measuring techniques. |  |  |  |  |  |

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| **Standard** | **Dates Taught** | | | | **Notes** |
| **Fasteners, Sealants, and Gaskets** | | | | | |
| 1. Identify fasteners used on small gas engines and implements. |  |  |  |  |  |
| 1. Remove and install various fasteners correctly. |  |  |  |  |  |
| 1. Repair or produce internal and external threads. |  |  |  |  |  |
| 1. Properly select and install fasteners. |  |  |  |  |  |
| 1. Remove, select, and install gaskets correctly. |  |  |  |  |  |
| **Two-Cycle and Four-Cycle Engines** | | | | | |
| 1. Describe four-stroke cycle engine operation and explain the purpose of each stroke. |  |  |  |  |  |
| 1. Explain the concept of valve timing. |  |  |  |  |  |
| 1. Compare the lubrication system in a four-cycle engine to the system of a two-cycle engine. |  |  |  |  |  |
| 1. Describe two-stroke cycle engine operation and explain the principles of two-cycle operation. |  |  |  |  |  |
| 1. List the advantage and disadvantages of two-cycle and four-cycle engines. |  |  |  |  |  |
| **Engine Construction and Principles of Operation** | | | | | |
| 1. Explain simple engine operation. |  |  |  |  |  |
| 1. List the qualities of gasoline that make it an efficient fuel for small engines. |  |  |  |  |  |
| 1. Explain why gasoline is atomized in the small engine. |  |  |  |  |  |
| 1. Identify the basic components of a small engine and describe the function of each part. |  |  |  |  |  |

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| **Standard** | **Dates Taught** | | | | **Notes** |
| **Measuring Engine Performance** | | | | | |
| 1. Define engine performance. |  |  |  |  |  |
| 1. Define and compute bore, stroke, displacement, compression ratio, force, work, power, energy, and horsepower. |  |  |  |  |  |
| 1. Differentiate between the various types of horsepower. |  |  |  |  |  |
| 1. Explain the function of a Prony brake and a dynamometer. |  |  |  |  |  |
| 1. Define and calculagte torque. |  |  |  |  |  |
| 1. Explain volumetric efficiency, practical efficiency, mechanical efficiency, and thermal efficiency. |  |  |  |  |  |
| **Engine Inspection, Disassembly, and Cylinder Reconditioning** | | | | | |
| 1. Inspect engines for problems. |  |  |  |  |  |
| 1. Describe the procedure for removing an engine from an implement. |  |  |  |  |  |
| 1. List the steps involved in disassembling an engine. |  |  |  |  |  |
| 1. Measure cylinder conditions such as wear and out-of-roundness. |  |  |  |  |  |
| 1. Explain the procedures involved in reboring a cylinder. |  |  |  |  |  |
| 1. Summarize the reasons for honing a cyclinder. |  |  |  |  |  |
| **Piston and Piston Ring Service** | | | | | |
| 1. Describe piston and piston ring compression. |  |  |  |  |  |
| 1. Differentiate between compression rings and oil control rings. |  |  |  |  |  |
| 1. Explain the purpose of ring end gap. |  |  |  |  |  |
| 1. Identify common types of piston damage and list possible causes. |  |  |  |  |  |
| 1. Summarize what happens during piston rin wear-in. |  |  |  |  |  |
| 1. Explain the purpose of a piston pin. |  |  |  |  |  |

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| **Standard** | **Dates Taught** | | | | **Notes** |
| **Bearing, Crankshaft, Valve, and Camshaft Service** | | | | | |
| 1. Describe the function of the connecting rod and the bearings. |  |  |  |  |  |
| 1. Define bearing spread and bearing crush. |  |  |  |  |  |
| 1. Differentiate between friction bearings and antifriction bearings. |  |  |  |  |  |
| 1. Summarize the function of the crankshaft. |  |  |  |  |  |
| 1. Service conventional and overhead valve assemblies. |  |  |  |  |  |
| 1. Explain the operation of ports, reeds, and rotary valves. |  |  |  |  |  |
| 1. Describe the purpose of the camshaft. |  |  |  |  |  |
| 1. Explain the purpose of an automatic compression release. |  |  |  |  |  |
| **Fuel and Emission Control Systems** | | | | | |
| 1. Name various types of fueld that can be used in a small engine and list practical applications for each. |  |  |  |  |  |
| 1. Explain the importance of proper fuel-oil mixture in a two-cycle engine. |  |  |  |  |  |
| 1. Describe the purpose of fuel filters. |  |  |  |  |  |
| 1. Explain fuel pump operation. |  |  |  |  |  |
| 1. Describe the operationof a pressurized fuel system. |  |  |  |  |  |
| 1. Explain the importance of emission control. |  |  |  |  |  |
| **Carburetion** | | | | | |
| 1. List and explain the principles of carburetion. |  |  |  |  |  |
| 1. Identify the three basic types of carburetors. |  |  |  |  |  |
| 1. Explain float-type carburetor operation. |  |  |  |  |  |
| 1. Explain the operation of the diaphragm-type carburetors. |  |  |  |  |  |
| 1. Define manual throttle controls. |  |  |  |  |  |
| 1. List the basic functions of a governor. |  |  |  |  |  |
| 1. Adjust and maintain common governors. |  |  |  |  |  |
| 1. Describe the purpose of an air cleaner. |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- |
| **Standard** | **Dates Taught** | | | | **Notes** |
| **Fuel System Service** | | | | | |
| 1. Test a fuel pump for proper operation. |  |  |  |  |  |
| 1. Summarize basic carburetor adjustments. |  |  |  |  |  |
| 1. Test two-cycle engine reeds for leakage. |  |  |  |  |  |
| 1. Explain basic procedures for inspecting, overhauling and adjusting diaphragm and float-type carburetors. |  |  |  |  |  |
| 1. Troubleshoot flat-type and diaphragm-type carburetors. |  |  |  |  |  |
| **Ignition System** | | | | | |
| 1. List the primary purposes of the ignition system. |  |  |  |  |  |
| 1. Identify the components in a typical magneto system and describe the function of each part. |  |  |  |  |  |
| 1. Describe small engine ignition advance systems. |  |  |  |  |  |
| 1. List the advantages of a solid state ignition system. |  |  |  |  |  |
| 1. Identify the three general classifications of magneto ignition systems and explain the operation of each. |  |  |  |  |  |
| 1. Describe the operation of a battery ignition system. |  |  |  |  |  |
| **Ignition System Service** | | | | | |
| 1. Examine spark plug deposits for signs of abnormal combustion. |  |  |  |  |  |
| 1. Clean, gap and install spark plugs correctly. |  |  |  |  |  |
| 1. Explain the basic inspections and tests used to verify proper ignition system operation. |  |  |  |  |  |
| 1. Adjust breaker points, piston height, and ignition spark timing. |  |  |  |  |  |
| 1. Explain basic tests for breaker point and solid state ignition systems. |  |  |  |  |  |
| 1. Explain typical service procedures for battery ignition systems. |  |  |  |  |  |

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| **Standard** | **Dates Taught** | | | | **Notes** |
| **Lubrication Systems** | | | | | |
| 1. Define friction and explain how it affects the internal engine components. |  |  |  |  |  |
| 1. List the functions of lubricating oil. |  |  |  |  |  |
| 1. Differentiate between the lubrication systems in a two-cycle engine and four-cycle engine. |  |  |  |  |  |
| 1. Explain the operation of ejection pumps, barrel pumps, and positive displacement pumps. |  |  |  |  |  |
| 1. Explain the function oil filter systems and differentiate between the three main types. |  |  |  |  |  |
| **Cooling Systems** | | | | | |
| 1. Explain how air cooling, exhaust cooling, and water cooling work to lower engine operating temperatures. |  |  |  |  |  |
| 1. Define the basic function of a water pump and give examples of several common types. |  |  |  |  |  |
| 1. Describe the basic operation of outboard water circulation systems. |  |  |  |  |  |
| 1. Explain the function of a thermostat and a radiator. |  |  |  |  |  |
| **Preventive Maintenance and Troubleshooting** | | | | | |
| 1. Explain the function of a thermostat and a radiator. |  |  |  |  |  |
| 1. Change the oil in a four-cycle engine. |  |  |  |  |  |
| 1. Mix fuel and oil correctly for a two cycle engine . |  |  |  |  |  |
| 1. Perform preventive maintenance on various engine systems; including the crankcase breather, air cleaner, and muffler. |  |  |  |  |  |
| 1. Prepare a water cooling system for storage. |  |  |  |  |  |
| 1. Describe systematic troubleshooting. |  |  |  |  |  |
| 1. Use manufacturer’s service manuals to determine engine specifications and explain why this information is necessary when servicing a small engine. |  |  |  |  |  |

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| **Opportunities in FFA** | | | | | |
| 1. Research and present a 4-6 minute speech on an agricultural topic. |  |  |  |  |  |
| 1. Serve on a POA committee. |  |  |  |  |  |
| 1. Participate in at least one activity above the chapter level. |  |  |  |  |  |
| 1. Demonstrate concise, impromptu speaking skills. |  |  |  |  |  |
| 1. Conduct strengths assessment to determine possible career options. |  |  |  |  |  |
| **SAE** | | | | | |
| 1. Maintain records on income and expense. |  |  |  |  |  |
| 1. Complete a cash flow statement. |  |  |  |  |  |
| 1. Complete year end records. |  |  |  |  |  |
| 1. Complete an SAE packet. |  |  |  |  |  |
| 1. Complete a proficiency aware application. |  |  |  |  |  |

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| **Standard** | **Dates Taught** | | | | **Notes** |
| **Workplace Skills and Work Ethics** | | | | | |
| 1. Interpret workplace policies related to: |  |  |  |  |  |
| 1. Safety |  |  |  |  |  |
| 1. Personal hygiene |  |  |  |  |  |
| 1. Absences and personal leave |  |  |  |  |  |
| 1. Substance abuse |  |  |  |  |  |
| 1. Employee theft |  |  |  |  |  |
| 1. Sexual harassment |  |  |  |  |  |
| 1. Termination/Legal actions |  |  |  |  |  |
| 1. Punctuality and dependability |  |  |  |  |  |
| 1. Reponsibliity of position |  |  |  |  |  |
| 1. Accuracy |  |  |  |  |  |
| 1. Cost effectivness |  |  |  |  |  |
| 1. Understand and value effective work ethic attitudes and behaviors such as: |  |  |  |  |  |
| 1. Acceptance of the job requirement. |  |  |  |  |  |
| 1. A wilingness to take initiviatve with new challenges. |  |  |  |  |  |
| 1. Take responsibility for decision and actions. |  |  |  |  |  |
| 1. Compare and complete various examples of job application forms. |  |  |  |  |  |
| 1. Demonstrate personal characteristics that lead to job satisfaction. |  |  |  |  |  |
| 1. Maintain an opening to lifelong learning. |  |  |  |  |  |
| 1. Create a portfolio or resume’ or other means that display academic and technical skill and accomplishments. |  |  |  |  |  |

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| **Standard** | **Dates Taught** | | | | **Notes** |
| **Mathematics** | | | | | |
| 1. Estimate, apply and solve problems involving fraction, decimals, percentages, and real numbers. |  |  |  |  |  |
| 1. Decide whether a problem situation is best solved using computer, calculator, paper and pencil, or mental arithmetic/estimation techniques. |  |  |  |  |  |
| 1. Translate written and/or verbal statements into mathematical expressions. |  |  |  |  |  |
| 1. Convert common units of measurement within and/or across measurment systems (metric/English, etc.). |  |  |  |  |  |
| 1. Construct and interpret tables, charts, maps, and/or graphs. |  |  |  |  |  |
| 1. Apply measurement concepts of distance, direction, rate, time, and acceleration. |  |  |  |  |  |
| 1. Interpret measures of central tendenc mean, median, mode, and variance. |  |  |  |  |  |
| **Time Management** | | | | | |
| 1. Identify influences on use of time. |  |  |  |  |  |
| 1. Set priorities or the order in which several. |  |  |  |  |  |
| 1. tasks will be accomplished. |  |  |  |  |  |
| 1. Identify and eliminate time traps and time wasters. |  |  |  |  |  |
| 1. Develop strategies to meet deadlines and budget time for completing tasks. |  |  |  |  |  |
| 1. Demonstrate stress management skills. |  |  |  |  |  |