

Power Technology 2A: Small Engines 2

Grades 10-12

Units of Credit: One Year (Elective)

Prerequisites: Power Technology 1

Course Description:

Small Engines 2A students will learn how to repair gasoline engines used in power boats, motorcycles, ATVs, snowmobiles, chainsaws and lawn and garden equipment. Instruction includes locating the source of trouble with engines, using appropriate hand tools and instruments, dismantling of engines and drive systems for examination of parts (such as rings and bearings) and using the proper tools. Adjustments of carburetors, magnetos and ignition systems are also included. Students will be expected to learn how to maintain appropriate business records and parts inventory and to determine the cost of materials and labor charges. Second and third semester students may advance to larger engines, and continue to work on four wheelers, snow machines and outboard motors.

All advanced students need to be motivated and able to work independently on engine troubleshooting and making repairs according to industry standards. Purchase of safety glasses and coveralls is required. This course consists of classroom instruction and assignments and hands-on lab activities. Assessments include written and oral student responses, student assembled engine and presentation, teacher observation, and performance assessment of learning activities and tasks.

Topics:

- Introduction to Small Engine Repair
- Small Engine Parts and Operations
- Small Engine Lubrication and Cooling Systems
- Small Engine Ignition Systems
- Small Engine Electrical Systems
- Small Engine Fuel Systems
- Engine Disassembly
- Engine Rebuild
- Engine Reassembly
- Power Transmission Systems
- Servicing Lawn Mowers and Riding Mowers
- Servicing Garden Tractors
- Servicing Two-Stroke and Four-Stroke Power Equipment: Part 1
- Servicing Two-Stroke and Four-Stroke Power Equipment: Part 2
- Servicing Outboard Engines
- Your Outdoor Power Equipment Repair Business
- Work Experience Option
- Internship

NOTE: Throughout this document, learning target types are identified as knowledge (“K”), reasoning (“R”), skill (“S”), or product (“P”).

STANDARD 1: Students experience various career opportunities and assess personal career pathways.

Benchmark 1:

Explore and identify personal interests, aptitudes, and abilities and develop strategies to achieve tentative career goals.

Learning Targets (Type):

1. I can use Montana Career Information Systems (MCIS) and/or other systems or web resources to investigate and evaluate my personal interests, aptitudes and abilities. (S)
2. I can formulate tentative career goals. (R)
3. I can evaluate approaches for meeting my goals. (R)

Benchmark 2:

Utilize local resources to research career plans.

Learning Targets (Type):

1. I can identify local resources to develop career plans. (K)
2. I can contact my school career counselor or teacher to pursue career pathways. (S)

Benchmark 3:

Recognize the interrelationships of family, community, career, and leisure roles.

Learning Targets (Type):

1. I can describe the importance of balance between family and community in regards to career and leisure activities. (K)
2. I can compare and contrast the needs of career and leisure activities and how they relate to and/or affect family and community. (R)

STANDARD 2: Students demonstrate an understanding and apply principles of Resource Management (i.e., financial, time, personal management).

Benchmark 1:

Prepare a budget and keep financial records.

Learning Targets (Type):

1. I can research and report cost of materials and time. (R,S)
2. I can document financial inputs and outputs. (S)
3. I can identify the necessity to maintain accurate financial records. (K)
4. I can stay within a fixed budget. (S,P)

Benchmark 2:

Prioritize, allocate time, prepare and follow schedules to complete a project.

Learning Targets (Type):

1. I can estimate the required time to complete a project. (R)
2. I can prioritize resources, equipment and tasks. (R)
3. I can reflect upon completion. (K)

Benchmark 3:

Apply appropriate time to task.

Learning Targets (Type):

1. I can implement a time schedule for task completion. (S)

Benchmark 4:

Use physical resources wisely to accomplish a goal.

Learning Targets (Type):

1. I can identify the resources necessary to accomplish the task. (K)
2. I can maintain the tools of the trade. (S)
3. I can maximize the use of my resources. (S)

STANDARD 3: Students acquire and utilize personal and leadership skills to become successful, productive citizens.

Benchmark 1:

Demonstrate active leadership skills by participation in group activities and projects.

Learning Targets (Type):

1. I can investigate various leadership styles. (R)
2. I can apply leadership styles in group activities and projects. (R)

Benchmark 2:

Demonstrate positive personal and work ethics.

Learning Targets (Type):

1. I can show up for class and work on time. (S)
2. I can develop personal and work related goals. (K,P)
3. I can describe ethical behavior in the workplace. (K)

Benchmark 3:

Demonstrate skills to be a productive citizen.

Learning Targets (Type):

1. I can develop professional relationships with community members. (S)
2. I can contribute to my community in a positive manner. (S,P)

Benchmark 4:

Apply self-esteem building practices.

Learning Targets (Type):

1. I can define and provide evidence of my strengths in my career interest areas. (K,S)
2. I can persevere through set backs and stay focused on my goals. (S)

Benchmark 5:

Demonstrate appreciation for diverse perspective needs and characteristics.

Learning Targets (Type):

1. I can develop a working relationship with diverse populations. (K,S)
2. I can demonstrate communication skills that contribute to positive relationships. (S)
3. I can work to understand diverse points of view. (R)

Benchmark 6:

Practice several methods of effective communication.

Learning Targets (Type):

1. I can demonstrate good listening skills. (S)
2. I can effectively communicate verbally through collaborative projects. (S,P)
3. I can develop quality written professional communications. (P)

STANDARD 4: Students acquire and demonstrate current technical skills leading to an occupation.

Benchmark 1:

Practice technical skills and procedures required for an occupation.

Learning Targets (Type):

1. I can use tools, machines, and equipment to manufacture or produce solutions to problems. (K,S)
2. I can practice appropriate Power Tech techniques based on knowledge of modern equipment and newly developed Power Tech processes. (K,S)
3. I can recognize the career opportunities for a person with Power Tech skills. (K)
4. I can assess skills and distribute work accordingly; evaluate performance and provide feedback toward the accomplishment of personal and team goals. (R,S)
5. I can disassemble and assemble an engine from component parts. (K,S)
6. I can apply the concepts and skills of the trade to simulate actual work situations. (K,S)
7. I can apply the essential knowledge and skills in small engines to work-based learning experiences including, but not limited to, cooperative education, job shadowing, mentoring, and apprenticeship training. (K,S)
8. I can discover the principles of group participation and leadership related to citizenship and career preparation. (R,S)
9. I can summarize major issues facing engine repair personnel related to customer satisfaction. (K,S)
10. I can assess the employability characteristics of a successful worker in the modern workplace. (R,S)
11. I can use measurement tools and units appropriately and recognize limitations in the precision of the measurement tools. (K)
12. I can derive and use formulas for area, surface area, and volume of many types of figures. (K,S)
13. I can analyze how matter is affected by changes in temperature, pressure and volume. (K,R,S)
14. I can use mathematics to describe the work and power in a system. (K)
15. I can use mathematics to describe and predict electrical and magnetic activity (current, resistance, voltage). (K,R)
16. I can compare and contrast how conductors, semiconductors, and superconductors work and describe their present and potential uses. (K,R)
17. I can demonstrate an understanding that energy can be found in chemical bonds and can be used when it is released from those bonds. (K)
18. I can use mathematics to describe the work and power in a system. (K)
19. I can use mathematics to describe and predict electrical and magnetic activity (current, resistance, voltage). (K)
20. I can compare and contrast how conductors, semiconductors, and superconductors work and describe their present and potential uses. (K,R)

Benchmark 2:

Practice safe and appropriate use of technology.

Learning Targets (Type):

1. I can demonstrate knowledge of new and emerging technologies that may affect the field small engines. (S)
2. I can utilize correct techniques for proper handling of hazardous materials. (K,R,S)
3. I can demonstrate knowledge of concepts and skills related to health and safety in the

workplace. (K,S)

4. I can safely use hand and power tools and equipment commonly employed in the service and repair of small engines. (K,S)

Benchmark 3:

Select the appropriate tools, equipment, and procedures for the task.

Learning Targets (Type):

1. I can demonstrate skills and knowledge of current equipment, materials, and processes used in related careers. (K,S)
2. I can use and apply basic Power Tech processes in an industrial environment. (S)
3. I can allocate and evaluate time, materials, facilities and resources to set and achieve goals. (R,S)
4. I can assess skills and distribute work accordingly; evaluate performance and provide feedback toward the accomplishment of personal and team goals. (R,S)
5. I can develop a plan for proper overhaul and maintenance. (K,S)
6. I can understand the functions and the applications of the tools, equipment, technologies, and materials used in small engine services. (K,S)

Benchmark 4:

Manage and maintain technological tools and follow troubleshooting protocol.

Learning Targets (Type):

1. I can gather, compile and analyze data from a variety of sources, and evaluate relevance and accuracy in making informed decisions in the workplace. (R,S)
2. I can organize, process, analyze, and maintain written and computerized records and other forms of information using systematic methods. (R,S)
3. I can diagnose and remedy the problems in a non-working engine. (R,S)

Benchmark 5:

Apply technical information to a variety of sources.

Learning Targets (Type):

1. I can use cross-curricular resources and knowledge to develop solutions to problems. (K,S,P)
2. I can develop knowledge to create innovative solutions and ideas. (R,S)
3. I can demonstrate and teach a learned skill including performance evaluation of self and others in this process. (K,S)
4. I can select, analyze, and present information using a variety of methods (e.g., oral, written, graphic, pictorial, multimedia). (R,S)
5. I can identify the key components of a small engine. (K)
6. I can read and interpret appropriate schematics, charts and service-repair manuals and bulletins. (K,S)
7. I can demonstrate knowledge of new and emerging technologies that may affect the service of small engines. (K,S)

STANDARD 5: Students know and demonstrate the requirements of the workplace through authentic application.

Benchmark 1:

Practice and demonstrate academic and technical skills to a workplace setting.

Learning Targets (Type):

1. I can practice, and demonstrate my technical workplace skills in my school lab. (S)
2. I can research, write and present on the technical content utilizing academic skills found

in workplace settings. (R,S,P)

Benchmark 2:

Apply the concepts of entrepreneurship.

Learning Targets (Type):

1. I can explain the concepts of entrepreneurship. (K)
2. I can demonstrate the concepts of entrepreneurship through a unique project. (R,S)
3. I can present my unique project to an authentic audience. (S,P)

Benchmark 3:

Identify possible outcomes and consequences of decisions.

Learning Targets (Type):

1. I can identify possible consequences of carelessness and horseplay. (K)
2. I can explain potential outcomes of not following directions, (i.e. safety, guidelines, rubrics). (R)

Benchmark 4:

Use acceptable industry standard equipment in a school setting.

Learning Targets (Type):

1. I can successfully use acceptable industry standard equipment to produce an authentic product within budget constraints. (S,R,P)