

# **Welding Technology 1**

## **Grades 9-12**

**Units of Credit:** One Semester (Elective)

**Prerequisites:** None

**Course Description:**

Welding Technology 1 offers students an opportunity to learn the fundamentals of welding technology. This includes using Miller and Lincoln arc welding equipment, Hypertherm Plasma Cutting machines, and Miller and Lincoln wire feed welders. Current industry standards are introduced by having students work on forming basic welds such as t welds, butt welds, and lap welds. Once those welding skills are developed, students will work on the creation of a small project using those skills. Students will learn basic metallurgy such as how like steels are fused and the heat necessary to create a solid weld. Students who learn these skills will be able to repair steel structures and create various metal projects with these skills. Welding processes are commonly used in the manufacturing and construction fields. There are many career opportunities for those with welding skills.

**Topics:**

- Welding and Personal Safety
- Care and Use of Equipment
- Joint Design and Construction
- Welding Terminology
- Introduction to Oxyacetylene Welding
- Introduction to Arc Welding
- Introduction to MIG Welding and Wire Feed Welding
- Torch and Plasma Cutting Processes
- Welding Career Opportunities

*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)
4. I can identify information related to welding technologies as it applies to continuing education and career decisions. (K)

5. I can demonstrate skills and knowledge of current equipment, materials, and processes used in related careers. (K,S)
6. I can recognize the career opportunities for a person with welding skills. (S)

**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)
5. I can use or prepare budgets, make forecasts, keep records, make adjustments to meet objectives, and evaluate financial records. (R,S)

**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)
4. I can select goal-relevant activities, rank them, allocate time, and prepare and follow schedules. (R,S)
5. I can develop organizational and time management skills as part of the problem-solving process. (R,S)
6. I can allocate and evaluate time, materials, facilities and resources to set and achieve goals. (R,S)

**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)
3. I can apply teamwork and cooperative learning skills. (R,S)
4. I can practice various roles required as a member of an effective team while recognizing individual differences and cultural diversity. (R,S)
5. I can demonstrate and teach a learned skill including performance evaluation of self and others in this process. (S)
6. I can demonstrate the principles of effective group participation and leadership related to citizenship and career preparation. (S)

**Benchmark 2:**

Demonstrate positive personal and work ethics.

**Learning Targets (Type):**

1. I can arrive on time for class and work. (S)
2. I can develop personal and work related goals. (K,R)
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)
4. I can communicate ideas to justify position, persuade and convince others, and responsibly challenge existing procedures and policies. (R,S)
5. I can practice and evaluate negotiating process including researching, goal setting, presenting, listening, clarifying, adjusting and compromising. (R,S)
6. I can practice and evaluate positive service skills (e.g., resolving misunderstanding, consumer complaints). (R,S)

**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,P)
2. I can set up for shielded metal arc welding operations on mild carbon steel. (K)
3. I can strike an arc and run a beading using shielded metal arc welding equipment on mild steel plate. (K)
4. I can operate oxyacetylene welding and cutting equipment. (K)
5. I can accurately layout a project using appropriate measuring tools. (K)
6. I can create basic weld joints in the flat position using the oxyacetylene welding process. (K)
7. I can set up for gas metal arc welding operations on mild steel. (K)
8. I can create basic weld joints in the flat position using the gas metal arc welding process. (K)
9. I can assess product quality using standard testing practices. (R,S)

**Benchmark 2:**

Practice safe and appropriate use of technology.

**Learning Targets (Type):**

1. I can utilize correct techniques for proper handling of hazardous materials. (K,S)
2. I can demonstrate knowledge of concepts and skills related to health and safety in the welding area. (K,S)
3. I can safely use grinding machines. (K,S)
4. I can use tools, materials, and equipment commonly employed in the industry in a safe manner. (S)
5. I can utilize correct techniques for proper handling of hazardous materials. (K,R,S)
6. I can demonstrate knowledge of concepts and skills related to health and safety in the workplace. (K,S)

**Benchmark 3:**

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

**Learning Targets (Type):**

1. I can identify the correct safety gear for the various welding processes. (K)
2. I can demonstrate skills and knowledge of current equipment, materials, and processes used in related careers. (K,S)
3. I can use and apply basic welding processes in an industrial environment. (S)
4. I can choose the best welding process for the job at hand. (R,S)

5. I can use tools, machines, and equipment to manufacture or produce solutions to problems. (R,S,P)
6. I can demonstrate knowledge of new and emerging technologies that may affect the field of welding. (K)

**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)

**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)
2. I can develop knowledge to create innovative solutions and ideas. (K,S)
3. I can demonstrate and teach a learned skill including performance evaluation of self and others in this process. (R,S)
4. I can select, analyze, and present information using a variety of methods (e.g., oral, written, graphic, pictorial, multimedia). (R,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. (S)
3. I can use and apply basic welding processes in an industrial environment. (S)
4. 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)
5. I can organize, process, analyze, and maintain written and computerized records and other forms of information using systematic methods. (R,S)
6. I can select, analyze, and present information using a variety of methods (e.g., oral, written, graphic, pictorial, multimedia). (R,S)
7. I can acquire, organize, communicate, process, analyze and evaluate information from print and electronic sources. (R,S)
8. I can use cross-curricular resources and knowledge to develop solutions to problems. (R,S)
9. I can develop knowledge to create innovative solutions and ideas. (R,S)

**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*)
2. I can practice appropriate welding techniques based on knowledge of modern equipment and newly developed welding processes. (*K,S*)