

Identifier	Poplar - Journeyman - Metal Working		Introduced	Completed
J MW 1	SAFETY AND EQUIPMENT			
J MW 1.1.01	General Rules	Pass safety test.		
J MW 1.1.02	General Rules	Identify and utilize proper storage for flammables.		
J MW 1.1.03	General Rules	Identify ventilation hazards and take corrective action.		
J MW 1.1.04	General Rules	Demonstrate the ability to keep a clean, orderly, and safe work area.		
J MW 1.1.05	General Rules	Demonstrate safe use of personal protective equipment.		
J MW 1.1.06	General Rules	Demonstrate safe use of machines, tools, and equipment.		
J MW 1.1.07	General Rules	Portray safe behaviors/attitudes while in the working environment.		
J MW 1.1.08	General Rules	Explain proper steps in reporting an injury/accident or emergency.		
J MW 1.1.09	General Rules	Demonstrate proper lifting techniques.		
J MW 1.1.10	General Rules	Identify and use hearing protection when needed.		
J MW 1.1.11	General Rules	Explain the purpose of OSHA.		
J MW 1.1.12	General Rules	Demonstrate the safe handling of compressed gases under the direct supervision of the instructor.		
J MW 1.2.01	Fire Rules	Describe the use of fire extinguishers / blankets.		
J MW 1.2.02	Fire Rules	Discuss the various types of fires Class A, B, C and D.		
J MW 1.2.03	Fire Rules	Demonstrate fire evacuation procedures.		
J MW 1.2.04	Fire Rules	Discuss and list potential fire hazards related to metalworking.		
J MW 1.2.05	Fire Rules	Demonstrate use of ventilation system controls in the metalworking lab.		
J MW 1.2.06	Fire Rules	Demonstrate proper storage of flammable materials.		
J MW 2	MEASUREMENT AND LAYOUT			
J MW 2.1.01	Measuring	Demonstrate the use of semi-precision measuring devices to 1/64".		
J MW 2.1.02	Measuring	Demonstrate the use of precision measuring devices to include micrometers and vernier calipers to 0.001".		
J MW 2.2.01	Layout	Demonstrate use of a combination square set, dividers, scratch awls, layout dye, soap stone, framing square, levels, trammel points and center punch.		
J MW 2.2.02	Layout	Demonstrate use of bar and c-clamps, jigs, and fixtures.		
J MW 2.2.03	Layout	Layout basic shapes and angles.		
J MW 2.3.01	Drawings	Develop a paper pattern as it applies to a sheet metal project.		
J MW 2.3.02	Drawings	Interpret symbols as they apply to working drawings.		
J MW 2.3.03	Drawings	Use orthographic projections to complete a working drawing.		
J MW 2.4.01	Mathematics	Apply math solutions using whole numbers, fractions, and decimals as they relate to metalworking lab projects.		
J MW 2.4.02	Mathematics	Solve mathematical problems using handbooks, tables, charts, and graphs.		
J MW 3	METALLURGY			
J MW 3.1.01	Types	Perform a spark test to determine ferrous or non-ferrous metals.		
J MW 3.1.02	Types	Identify metals such as steel, cast iron, aluminum, stainless steel, copper, brass, and zinc.		
J MW 3.1.03	Types	Define properties used to identify common metals (i.e., tensile strength, hardness, malleability, ductility).		
J MW 3.1.04	Types	List the five most common shapes of metal.		
J MW 3.1.05	Types	Identify thickness by using a wire gauge.		
J MW 3.2.01	Hardening/ Annealing	Demonstrate the hardening process.		
J MW 3.2.02	Hardening/ Annealing	Demonstrate the annealing process.		
J MW 3.2.03	Hardening/ Annealing	Demonstrate safe methods of handling hot metals.		
J MW 3.3.01	Heating/ Cooling	Describe expansion and contraction as a result of heating and cooling metals.		
J MW 3.3.02	Heating/ Cooling	Demonstrate safe methods of handling hot metals.		
J MW 4	TOOLS AND MACHINES			
J MW 4.1.01	Stationary	Demonstrate safe work practices for stationary power machines, including but not limited to: grinders, buffers, sanders, band saws, chop saws, shears, and presses.		
J MW 4.2.01	Portable	Demonstrate safe work practices for portable power machines, including but not limited to: grinders, buffers, sanders, band saws, shears, and drills.		
J MW 4.3.01	Hand Tools	Demonstrate safe work practices for hand tools, including but not limited to: pliers, files, chisels, punches, hard face and soft face hammers, hacksaw, vises, and brushes.		
J MW 5	WELDING TECHNIQUES			
J MW 5.1.01	Safety	Identify and list personal safety equipment in the metalworking lab.		
J MW 5.1.02	Safety	Demonstrate appropriate use of personal safety equipment necessary to complete assigned projects.		
J MW 5.1.03	Safety	Demonstrate the proper use of ventilation.		
J MW 5.1.04	Safety	Demonstrate the proper use of personal respiration equipment.		
J MW 5.2.01	Oxy-Fuel	Identify, select, and set-up oxy-fuel welding and cutting equipment.		
J MW 5.2.02	Oxy-Fuel	Select and safely operate oxy-fuel welding and cutting equipment used to complete assigned projects.		
J MW 5.2.03	Oxy-Fuel	Layout, cut, and fit materials (such as pipe, plate, and structural shapes).		
J MW 5.2.04	Oxy-Fuel	Identify safe handling procedures of cylinders according to OSHA standards.		
J MW 5.2.05	Oxy-Fuel	Demonstrate proper methods of cleaning and care of oxy-fuel welding and cutting tips.		
J MW 5.2.06	Oxy-Fuel	Identify, select, and use proper filler materials.		
J MW 5.3.01	Shielded Metal Arc	Identify, select, and set-up SMAW equipment.		

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J MW 5.3.02	Shielded Metal Arc	Select and safely operate SMAW equipment used to complete assigned projects.		
J MW 5.3.03	Shielded Metal Arc	Select appropriate electrodes to complete assignments.		
J MW 5.4.01	Gas Metal Arc	Identify, select, and set-up GMAW equipment.		
J MW 5.4.02	Gas Metal Arc	Select and safely operate GMAW equipment used to complete assigned projects.		
J MW 5.4.03	Gas Metal Arc	Select appropriate wire and gas to complete assignments.		
J MW 5.4.04	Gas Metal Arc	Select, set-up, and safely operate Flux Core Arc Welding (FCAW) equipment.		
J MW 5.5.01	Gas Tungsten Arc	Identify, select, and set-up GTAW equipment.		
J MW 5.5.02	Gas Tungsten Arc	Select and safely operate GTAW equipment used to complete assigned projects.		
J MW 5.5.03	Gas Tungsten Arc	Select appropriate electrodes and filler materials to complete assignments.		
J MW 5.5.04	Gas Tungsten Arc	Select appropriate gas to complete GTAW assignments.		
J MW 5.6.01	Plasma Arc	Set-up and safely operate plasma arc cutting equipment used to complete assigned projects.		
J MW 5.6.02	Plasma Arc	Use appropriate ventilation or personal respirator to complete assignments.		
J MW 6	SHEET METAL			
J MW 6.1.01	Patterns	Construct paper patterns for a simple sheet metal project.		
J MW 6.1.02	Patterns	Layout directly on metal using dyes, scribes, dividers, trammel points, and edge gauges.		
J MW 6.1.03	Patterns	Identify edges and seams used in typical sheet metal layout.		
J MW 6.1.04	Patterns	Demonstrate the use of a sheet metal gauge.		
J MW 6.2.01	Forming	Form sheet metal using a box and pan break, bar folder, slip roll, and a rotary machine for an assigned project.		
J MW 6.2.02	Forming	Cut sheet metal using foot shears, hand shears, Beverly shears, and Whitney punches for an assigned project.		
J MW 6.2.03	Forming	Use appropriate cutting and folding techniques to complete assigned project.		
J MW 6.3.01	Fastening	Demonstrate the ability to join sheet metal together with rivets, resistance welding, and seaming techniques.		
J MW 6.3.02	Fastening	Identify and list the various sheet metal fastening techniques.		
J MW 7	MACHINE TOOLS			
J MW 7.1.01	Cutting Lathe	Identify basic components of lathes.		
J MW 7.1.02	Cutting Lathe	Use charts and tables to determine cutting, drilling, and knurling speeds.		
J MW 7.1.03	Cutting Lathe	Select proper cutting tool based on job requirements.		
J MW 7.1.04	Cutting Lathe	Demonstrate the ability to safely face, straight turn, shoulder turn, center drill, and knurl a work piece.		
J MW 7.1.05	Cutting Lathe	Demonstrate ability to safely sharpen cutting tools.		
J MW 7.2.01	Milling	Identify all of the components of vertical milling machines.		
J MW 7.2.02	Milling	Demonstrate the ability to safely apply work-securing devices.		
J MW 7.2.03	Milling	Use charts and tables to determine feeds and speeds.		
J MW 7.2.04	Milling	Select appropriate cutting tool based on assigned project.		
J MW 7.2.05	Milling	Demonstrate the ability to safely mill to a specified size.		
J MW 7.3.01	Drill Press	Identify components of the drill press.		
J MW 7.3.02	Drill Press	Set up and securely clamp a work piece to the drill press table.		
J MW 7.3.03	Drill Press	Use charts and tables to determine cutting speeds and feeds for drilling a specific medium.		
J MW 7.3.04	Drill Press	Select appropriate drill type based on job requirements.		
J MW 7.3.05	Drill Press	Use bench grinder to sharpen drill bits.		
J MW 7.3.06	Drill Press	Demonstrate proper dress and observe safe operating procedures while using the drill press.		
J MW 8	EMPLOYABILITY SKILLS			
J MW 8.1.01	Problem Solving	Solve a metalworking problem using the appropriate steps in the problem-solving process.		
J MW 8.1.02	Problem Solving	Demonstrate brainstorming techniques.		
J MW 8.1.03	Problem Solving	Examine and explain the advantages and disadvantages of alternative solutions to one or more problems.		
J MW 8.1.04	Problem Solving	Create an action plan based upon a solution to a metalworking problem.		
J MW 8.1.05	Problem Solving	Identify the benefits of solving a metalworking problem.		
J MW 8.2.01	Critical Thinking	Identify and explain the essential elements of the critical-thinking process as related to the metalworking trades.		
J MW 8.2.02	Critical Thinking	Demonstrate critical-thinking skills necessary in the metalworking trades.		
J MW 8.2.03	Critical Thinking	Explain how emotional thinking and logical thinking affect decision making in the metalworking trades.		
J MW 8.2.04	Critical Thinking	Explain the difference between reliable and unreliable observations and statements of fact.		
J MW 8.2.05	Critical Thinking	Recognize patterns or relationships through observation and discovery.		
J MW 8.3.01	Speak, Write, Listen	Explain the benefits of effective communication skills in the workplace.		
J MW 8.3.02	Speak, Write, Listen	Effectively interpret and respond to verbal and nonverbal messages.		
J MW 8.3.03	Speak, Write, Listen	Demonstrate proper telephone etiquette.		
J MW 8.3.04	Speak, Write, Listen	Effectively communicate thoughts, ideas and information in writing.		
J MW 8.3.05	Speak, Write, Listen	Organize ideas and communicate orally; is able to effectively demonstrate job skills to others.		
J MW 8.3.06	Speak, Write, Listen	Locate, understand and interpret written information in documents such as manuals, graphs and schedules.		

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J MW 8.3.07	Speak, Write, Listen	Select and utilize an appropriate medium for conveying messages with dignity and respect.		
J MW 8.3.08	Speak, Write, Listen	Organize information into the appropriate format in accordance with standard practices, which includes prewriting, drafting, proofreading, editing/revising, and preparing final copy.		
J MW 8.3.09	Speak, Write, Listen	Demonstrate sensitivity to cultural diversity in communication.		
J MW 8.3.10	Speak, Write, Listen	Identify common communication barriers and methods for improving communication.		
J MW 8.4.01	Technology	Demonstrate ability to utilize basic keyboarding techniques.		
J MW 8.4.02	Technology	Demonstrate ability to utilize other input devices.		
J MW 8.4.03	Technology	Demonstrate ability to utilize various electronic research methods.		
J MW 8.4.04	Technology	Demonstrate knowledge of the basic technology systems currently available and how they apply to your field (i.e., word processing, spreadsheets, multimedia applications and databases).		
J MW 8.4.05	Technology	Investigate and explain the use, benefits, and costs of technological developments in the workplace and school.		
J MW 8.4.06	Technology	Identify and demonstrate the appropriate use of technology to enhance the efficiency of the workplace and school.		
J MW 8.4.07	Technology	Demonstrate routine maintenance and repair of technological equipment.		
J MW 8.5.01	Leadership and Teamwork	Work cooperatively with others when given group project.		
J MW 8.5.02	Leadership and Teamwork	Explain traits necessary to effectively lead and influence individuals and groups.		
J MW 8.5.03	Leadership and Teamwork	Demonstrate appropriate attitudes and behaviors for effective leadership.		
J MW 8.5.04	Leadership and Teamwork	Demonstrate respect for team members, team processes, and team goals.		
J MW 8.5.05	Leadership and Teamwork	Participate in the implementation of a group's decision and evaluate the results.		
J MW 8.5.06	Leadership and Teamwork	Demonstrate the qualities of an effective leader and team member.		
J MW 8.5.07	Leadership and Teamwork	Describe the importance of a proper dress code.		
J MW 8.6.01	Ethics	Develop personal work ethics through work experience.		
J MW 8.6.02	Ethics	Describe the importance of ethics practiced in the workplace.		
J MW 8.6.03	Ethics	Demonstrate regular attendance, promptness, and the willingness to follow instructions and complete an assigned task.		
J MW 8.6.04	Ethics	Demonstrate appropriate personal and professional attitudes and behaviors.		
J MW 8.6.05	Ethics	Maintain a safe, clean, and organized work area.		
J MW 8.6.06	Ethics	Demonstrate awareness of legal responsibilities related to individual performance, safety, and customer satisfaction.		
J MW 8.6.07	Ethics	Demonstrate knowledge of various types of harassment.		
J MW 8.7.01	Workplace	Develop a time schedule and prioritized task list to complete a job assignment.		
J MW 8.7.02	Workplace	Identify the resources needed to complete a job assignment.		
J MW 8.7.03	Workplace	Organize the material resources and space requirements needed to complete a job assignment.		
J MW 8.7.04	Workplace	Effectively use technology to complete a job assignment.		
J MW 8.7.05	Workplace	Demonstrate cooperation and leadership as a team at school or in a workplace setting.		
J MW 8.7.06	Workplace	Use the basic components of effective time management.		
J MW 8.7.07	Workplace	Recognize the need for management skills in the workplace with regard to stress, anger management, and substance abuse.		
J MW 8.8.01	Career	Prepare a job application.		
J MW 8.8.02	Career	Prepare a personal resume.		
J MW 8.8.03	Career	Complete a personal aptitude and interest inventory.		
J MW 8.8.04	Career	Participate in a mock job interview.		
J MW 8.8.05	Career	Establish short-term career goals.		
J MW 8.8.06	Career	Establish long-term career goals.		
J MW 8.8.07	Career	Use the Montana Career Information System (CIS) or a similar computer-based program to research careers in a chosen field.		
J MW 8.8.08	Career	Participate in an organized job-shadowing activity.		
J MW 8.8.09	Career	Participate in a community service project.		
J MW 8.8.10	Career	Construct a career portfolio.		
J MW 8.9.01	Retention	Maintain an employment/career portfolio.		
J MW 8.9.02	Retention	Explain strategies for balancing work and family roles.		
J MW 8.9.03	Retention	Demonstrate understanding of the need for lifelong learning in a rapidly changing job market.		
J MW 8.9.04	Retention	Describe strategies to maintain employment in the face of job reductions.		
J MW 8.9.05	Retention	Develop long-term career planning strategies.		
J MW 8.9.06	Retention	Describe various educational options needed for job retention.		
J MW 8.9.07	Retention	Model sound workplace ethics, such as loyalty, punctuality, and initiative.		
J MW 8.9.08	Retention	Demonstrate interpersonal skills needed for job retention.		