

**STATE SKILL STANDARDS
WELDING**

Career & Technical Education

Skills for Employment & Lifelong Learning



Prepared by:

Office of Career, Technical, and Adult Education
Nevada Department of Education
700 E. Fifth Street
Carson City, NV 89701

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Writing Team Members

Mike Pointer
Regional Technical Institute, Reno

Randy Naylor
Western Nevada Community College, Carson City

John Warden
Wooster High School, Reno

Gene Senek
Spanish Springs High School, Sparks

Charles Shirley
Carson High School, Carson City

Lew Lefcourt
Galena High School, Reno

Justin Munson
Carlin High School, Carlin

Art Johnson
Tonopah High School, Tonopah

Project Coordinator

Michael J. Raponi, Consultant
Office of Career, Technical, and Adult Education
Nevada Department of Education, Carson City

Introduction

The Department of Education has undertaken an ambitious effort to develop statewide occupational skill standards. The standards in this document are for welding programs and are designed to clearly state what the student should know and be able to do upon completion of an advanced high-school program.

The writing team determined that any statewide skill standards for programs that teach welding should be designed to teach entry-level and advanced skills according to the standards established by the American Welding Society (AWS). The standards cover the following areas: (1) Safety; (2) Measurement and Layout; (3) Metallurgy; (4) Tools and Machines; (5) Oxy-Fuel Welding/Cutting; (6) Shielded Metal Arc Welding; (7) Gas Metal Arc Welding; (8) Flux Core Arc Welding; (9) Gas Tungsten Arc Welding; (10) Plasma Arc Cutting; (11) Fabrication; (12) Weld Testing; (13) Employability Skills. The standards also include the math skills students need to be successful in the industry.

These exit-level standards are designed for advanced programs, for students completing the third level of a three- or four-year welding program. Students at the appropriate level of instruction will be expected to demonstrate competence for all performance indicators in the “meets standard” domains for each performance standard. Teachers are encouraged to use them to focus curriculum objectives for entry-level programs, also.

The standards are organized as follows:

Content Standards are general statements that identify major areas of knowledge, understanding, and skills students are expected to learn in key subject and career areas by the end of the program.

Following each Content Standard are a number of **Performance Standards**. Performance Standards identify the more specific components of each content standard and define the expected abilities of students within each content standard.

Each Performance Standard is analyzed into specific **Performance Indicators**. Performance Indicators are very specific criteria statements for determining whether a student exceeds the standard, meets the standard, or whose performance approaches the standard. Performance Indicators may also be used as learning outcomes which teachers can identify as they plan their program learning objectives.

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Content and Performance Standards
General Lab Safety

Content Standard 1.0: Students shall demonstrate safe work practices while performing operations in the welding lab.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 1.1 The student will demonstrate adherence to general lab safety rules including but not limited to those listed in the following performance indicators.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Customize or develop a lab safety program. • Obtain certification in First Aid/CPR. • Model lab safety as a mentor to students.
MEETS STANDARD	1.1.1 Pass safety test. 1.1.2 Identify and utilize proper storage for flammables. 1.1.3 Identify ventilation hazards and take corrective action. 1.1.4 Identify and report electrical hazards. 1.1.5 Demonstrate the ability to keep a clean, orderly, and safe work area. 1.1.6 Demonstrate safe use of personal protective equipment. 1.1.7 Demonstrate safe use of machines, tools, and equipment. 1.1.8 Portray safe behaviors/attitudes while in the working environment. 1.1.9 Explain proper steps in reporting an injury/accident or emergency. 1.1.10 Demonstrate proper lifting techniques. 1.1.11 Identify and use hearing protection when needed. 1.1.12 Explain the purpose of OSHA. 1.1.13 Demonstrate the safe handling of compressed gases under the direct supervision of the instructor.
APPROACHES STANDARD	<ul style="list-style-type: none"> • Read safety requirements found in the welding lab. • Identify safety procedures of machines, tools, and equipment. • Identify safe behaviors/attitudes. • List different types of hearing protection.

Nevada Academic Standards Correlation:
Science: 20.12.5, 24.12.1, 24.12.2, 24.12.3

Content and Performance Standards
General Lab Safety

Content Standard 1.0: Students shall demonstrate safe work practices while performing operations in the welding lab.

Performance Standard 1.2	The student will demonstrate adherence to specific lab fire safety rules and procedures including but not limited to those listed in the following performance indicators.
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Create a fire safety program.
MEETS STANDARD	<p>1.2.1 Describe the use of fire extinguishers and blankets.</p> <p>1.2.2 Discuss the various types of fires for Class A, B, C, & D.</p> <p>1.2.3 Demonstrate fire evacuation procedures.</p> <p>1.2.4 Discuss and list potential fire hazards that exist in the welding lab.</p> <p>1.2.5 Demonstrate use of ventilation system controls in the welding lab.</p> <p>1.2.6 Recognize need and demonstrate use of personal respirators in the welding lab.</p> <p>1.2.7 Demonstrate proper storage of flammable materials.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Read fire safety requirements found in the welding lab. • Identify fire evacuation procedures. • Identify all locations of fire extinguishers, safety blankets, and exit routes.

Nevada Academic Standards Correlation:
 Science: 24.12.1, 24.12.2

Content and Performance Standards
Measurement and Layout Techniques

Content Standard 2.0: Students will demonstrate proper use of layout tools/measuring tools and techniques that are commonly found in the welding lab.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 2.1 The student will use measuring tools to complete required lab assignments.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Demonstrate use of the metric measuring system as it applies to welding. • Demonstrate the use of fillet gauges. • Model appropriate measuring techniques to peers.
MEETS STANDARD	<p>2.1.1 Demonstrate the use of semi-precision measuring devices to 1/64”.</p> <p>2.1.2 Demonstrate the use of precision measuring devices to include micrometers and Vernier calipers to 0.001”.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify semi-precision measuring devices. • Identify precision measuring devices.

Nevada Academic Standards Correlation:
Math: 3.12.2, 3.12.3

Content and Performance Standards
Measurement and Layout Techniques

Content Standard 2.0: Students will demonstrate proper use of layout tools/measuring tools and techniques that are commonly found in the welding lab.

Performance Standard 2.2	The student will be able to use and apply layout tools to complete required lab projects.
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Layout advanced shapes and angles other than 45° and 90°. • Layout geometric shapes.
MEETS STANDARD	<p>2.2.1 Demonstrate use of a combination square set, dividers, scratch awls, layout fluid, soap stone, framing square, levels, trammel points and center punch.</p> <p>2.2.2 Demonstrate use of bar and c-clamps, jigs and fixtures.</p> <p>2.2.3 Demonstrate the use of layout equipment to the tolerance of 1/16" or 0.5° to complete assigned projects.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify common layout tools. • Observe a video and/or demonstration on layout tools and techniques.

Nevada Academic Standards Correlation:
 Math: 3.12.2, 3.12.3, 3.12.5

Content and Performance Standards
Measurement and Layout Techniques

Content Standard 2.0: Students will demonstrate proper use of layout tools/measuring tools and techniques that are commonly found in the welding lab.

Performance Standard 2.3 The student will be able to interpret basic prints and develop a working drawing.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Draw orthographic projections with an isometric or oblique view. • Interpret blueprint abbreviations and symbols. • Draw plans complete with dimensions and proper symbols.
MEETS STANDARD	<p>2.3.1 Interpret basic welding symbols and prints.</p> <p>2.3.2 Use orthographic projections to complete required assignments.</p> <p>2.3.3 Develop a working drawing with a bill of materials.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Differentiate between a working drawing and an orthographic projection. • Identify basic welding symbols.

Nevada Academic Standards Correlation:
 Math: 1.12.1, 3.12.3

Content and Performance Standards
Measurement and Layout Techniques

Content Standard 2.0: Students will demonstrate proper use of layout tools/measuring tools and techniques that are commonly found in the welding lab.

Performance Standard 2.4 The student will be able to apply basic mathematical skills common to the welding industry.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Apply math solutions in the welding lab using geometry.
MEETS STANDARD	2.4.1 Calculate math solutions using whole numbers, fractions, and decimals as they relate to welding projects. 2.4.2 Solve mathematical problems using handbooks, tables, charts, and graphs. 2.4.3 Identify units of measurement including lineal and volumetric. 2.4.4 Calculate the cost of materials.
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify whole numbers, fractions, and decimals. • Solve job-related problems operating a handheld calculator.

Nevada Academic Standards Correlation:
 Math: 1.12.1, 1.12.3, 3.12.3, 3.12.5

Content and Performance Standards
Metallurgy

Content Standard 3.0: Students will identify the classification and physical properties of different types of metals common to the welding industry.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 3.1 The student will identify metal types and shapes.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Demonstrate magnet and file test. • Analyze properties of metal alloys.
MEETS STANDARD	3.1.1 Perform a spark test to determine ferrous from non-ferrous materials. 3.1.2 Identify metals such as steel, cast iron, aluminum, stainless steel, copper, brass, and zinc. 3.1.3 Define properties used to identify common metals (i.e., tensile strength, hardness, malleability, ductility). 3.1.4 List the five most common shapes of metal. 3.1.5 Identify thickness by using a wire gauge.
APPROACHES STANDARD	<ul style="list-style-type: none"> • Describe metal making processes. • Observe a metal making process video.

Nevada Academic Standards Correlation:

Math: 3.12.2

Science: 2.12.1

Content and Performance Standards
Metallurgy

Content Standard 3.0: Students will identify the classification and physical properties of different types of metals common to the welding industry.

Performance Standard 3.2 The student will describe the effects of heating, cooling, and annealing processes of metals to be fabricated.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Demonstrate how metal is deformed during heating and cooling.
MEETS STANDARD	<p>3.2.1 Describe expansion and contraction as a result of heating and cooling metals.</p> <p>3.2.2 Demonstrate safe methods of handling hot metals.</p> <p>3.2.3 Demonstrate the annealing process.</p> <p>3.2.4 Explain the need for pre-, intermediate-, and post-heating techniques.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Recognize hot materials in the welding lab. • Explain the difference between tempering, hardening, and the annealing processes.

Nevada Academic Standards Correlation:
Science: 3.12.1, 24.12.1

Content and Performance Standards
Tools and Machines

Content Standard 4.0: Students will safely operate commonly used welding machines and tools.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 4.1 The student will identify and safely operate stationary power machines commonly used in the welding industry.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Perform basic maintenance on machinery to comply with safety requirements.
MEETS STANDARD	4.1.1 Demonstrate safe work practices for stationary power machines, including but not limited to: grinders, buffers, sanders, band saws, chop saws, shears, and presses.
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify basic stationary power machines such as grinders, buffers, sanders, band saws, chop saws, shears, and presses. • Identify safety features of basic stationary power machines such as grinders, buffers, sanders, band saws, chop saws, shears, and presses. • Observe safety video and demonstration.

Nevada Academic Standards Correlation:
Science: 24.12.1

Content and Performance Standards
Tools and Machines

Content Standard 4.0: Students will safely operate commonly used welding machines and tools.

Performance Standard 4.2 The student will identify and safely operate portable power machines commonly found in the welding industry.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Perform basic maintenance on portable power machines to comply with safety requirements.
MEETS STANDARD	4.2.1 Demonstrate safe work practices for portable power machines, including but not limited to: grinders, buffers, sanders, band saws, shears, and drills.
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify basic portable power machines such as grinders, buffers, sanders, band saws, shears, and drills. • Identify safety features of basic portable power machines such as grinders, buffers, sanders, band saws, shears, and drills. • Observe a safety video and demonstration.

Nevada Academic Standards Correlation:
 Science: 24.12.1

Content and Performance Standards
Tools and Machines

Content Standard 4.0: Students will safely operate commonly used welding machines and tools.

Performance Standard 4.3	The student will identify and safely use hand tools commonly found in the welding industry.
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Perform basic maintenance on chisels, punches, and related welding hand tools to comply with safety requirements.
MEETS STANDARD	<p>4.3.1 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.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify basic hand tools such as pliers, files, chisels, punches, hard face and soft face, hammers, hacksaw, vises, and brushes. • Identify safety features of basic hand tools such as pliers, files, chisels, punches, hard face and soft face hammers, hacksaw, vises, and brushes.

Nevada Academic Standards Correlation:
 Science: 24.12.1

Content and Performance Standards
Oxy-Fuel Welding/Cutting

Content Standard 5.0: Students will identify, select, setup, and demonstrate the use of oxy-fuel welding and cutting equipment.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 5.1 The student will demonstrate use of proper personal protective equipment and procedures.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Clean and maintain personal protective safety gear. • Develop a personal safety checklist.
MEETS STANDARD	5.1.1 Identify and list personal safety equipment in the welding lab. 5.1.2 Demonstrate appropriate use of personal safety equipment necessary to complete assigned projects. 5.1.3 Demonstrate the proper use of ventilation. 5.1.4 Demonstrate the proper use of personal respiration equipment.
APPROACHES STANDARD	<ul style="list-style-type: none"> • List personal protective safety equipment. • Observe a safety video and/or demonstration.

Nevada Academic Standards Correlation:
 Science: 24.12.1

Content and Performance Standards
Oxy-Fuel Welding/Cutting

Content Standard 5.0: Students will identify, select, setup, and demonstrate the use of oxy-fuel welding and cutting equipment.

Performance Standard 5.2 The student will identify, select, setup, and demonstrate the use of oxy-fuel welding equipment.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Demonstrate the ability to safely change cylinders used in oxy-fuel welding.
MEETS STANDARD	5.2.1 Select and safely operate oxy-fuel welding equipment used to complete assigned projects. 5.2.2 Layout, cut, and fit materials (such as pipe, plate and structural shapes). 5.2.3 Identify types of fuel gasses and their application. 5.2.4 Identify, select, and setup oxy-fuel welding equipment used to complete assigned projects. 5.2.5 Identify safe handling procedures of cylinders. 5.2.6 Demonstrate proper methods of cleaning and care of oxy-fuel welding equipment. 5.2.7 Select and exchange oxy-fuel welding attachments. 5.2.8 Identify, select, and use proper filler materials.
APPROACHES STANDARD	<ul style="list-style-type: none"> • List, identify and select oxy-fuel welding equipment. • Identify the various types of industrial gas cylinders. • Observe a video and/or demonstration.

Nevada Academic Standards Correlation:

Math: 3.12.2, 3.12.3, 4.12.7

Science: 24.12.1

Content and Performance Standards
Oxy-Fuel Welding/Cutting

Content Standard 5.0: Students will identify, select, setup, and demonstrate the use of oxy-fuel welding and cutting equipment.

Performance Standard 5.3 The student will identify, select, setup, and demonstrate the use of oxy-fuel cutting equipment.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Demonstrate piercing, slotting, and bevel cutting techniques. • Demonstrate the ability to safely change cylinders used in oxy-fuel cutting.
MEETS STANDARD	<p>5.3.1 Select and safely operate oxy-fuel cutting equipment used to complete assigned projects.</p> <p>5.3.2 Layout, cut, and fit materials (such as pipe, plate, and structural shapes).</p> <p>5.3.3 Identify types of fuel gasses and their application.</p> <p>5.3.4 Identify, select, and setup oxy-fuel cutting equipment used to complete assigned projects.</p> <p>5.3.5 Identify safe handling procedures of cylinders.</p> <p>5.3.6 Demonstrate proper methods of cleaning and care of oxy-fuel cutting equipment.</p> <p>5.3.7 Select and exchange oxy-fuel cutting attachments.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List, identify, and select oxy-fuel cutting equipment. • Identify the various types of industrial gas cylinders. • Observe a video and/or demonstration.

Nevada Academic Standards Correlation:

Math: 3.12.2, 3.12.3, 4.12.7

Science: 24.12.1, 24.12.3

Content and Performance Standards
Oxy-Fuel Welding/Cutting

Content Standard 5.0: Students will identify, select, setup, and demonstrate the use of oxy-fuel welding and cutting equipment.

Performance Standard 5.4 The student will identify, select, setup, and demonstrate the use of oxy-fuel brazing techniques.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Demonstrate the ability to safely change cylinders used in oxy-fuel brazing.
MEETS STANDARD	5.4.1 Select and safely operate oxy-fuel brazing equipment to complete assigned projects. 5.4.2 Prepare materials properly for brazing. 5.4.3 Identify types of fuel gasses and their application. 5.4.4 Identify, select, and setup oxy-fuel brazing equipment used to complete assigned projects. 5.4.5 Identify and select proper filler and flux materials. 5.4.6 Identify safe handling procedures of cylinders. 5.4.7 Demonstrate proper methods of cleaning and care of oxy-fuel brazing equipment. 5.4.8 Select and exchange oxy-fuel brazing attachments.
APPROACHES STANDARD	<ul style="list-style-type: none"> • List, identify, and select oxy-fuel brazing equipment. • Identify the various types of industrial gas cylinders. • Observe video and/or demonstration.

Nevada Academic Standards Correlation:
 Science: 24.12.1, 24.12.3

Content and Performance Standards
Shielded Metal Arc Welding

Content Standard 6.0: Students will identify, select, setup, and demonstrate the use of Shielded Metal Arc Welding (SMAW) equipment.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 6.1 The student will demonstrate safety procedures and describe the electrical theory of SMAW.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate SMAW safety techniques to peers. • Identify SMAW safety problems, their causes, and take corrective action.
MEETS STANDARD	<p>6.1.1 Identify, list, and evaluate safety concerns common to the SMAW process.</p> <p>6.1.2 Identify the different components of electricity and how they relate to the welding process.</p> <p>6.1.3 Identify the polarities and currents used in SMAW.</p> <p>6.1.4 Identify and explain the different types of power sources used.</p> <p>6.1.5 Identify and report potential electrical safety hazards.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List SMAW equipment. • Observe SMAW video and/or demonstration. • List five (5) SMAW safety concerns. • List personal safety gear required for SMAW.

Nevada Academic Standards Correlation:
 Science: 1.12.5, 3.12.4, 24.12.1

Content and Performance Standards
Shielded Metal Arc Welding

Content Standard 6.0: Students will identify, select, setup, and demonstrate the use of Shielded Metal Arc Welding (SMAW) equipment.

Performance Standard 6.2 The student will be able to select and setup the appropriate equipment and consumables used in SMAW.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate SMAW techniques to peers. • Identify SMAW problems, their causes, and take corrective action.
MEETS STANDARD	6.2.1 Identify, select, and setup SMAW equipment. 6.2.2 Select appropriate electrodes to complete assignments. 6.2.3 Identify proper electrode storage. 6.2.4 Select appropriate polarity and current settings.
APPROACHES STANDARD	<ul style="list-style-type: none"> • List SMAW equipment. • Observe SMAW video and/or demonstration.

Nevada Academic Standards Correlation:
 Science: 3.12.4, 24.12.3

Content and Performance Standards
Shielded Metal Arc Welding

Content Standard 6.0: Students will identify, select, setup, and demonstrate the use of Shielded Metal Arc Welding (SMAW) equipment.

Performance Standard 6.3 The student will demonstrate SMAW using appropriate safety techniques.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> Model appropriate SMAW techniques to peers. Identify SMAW problems, their causes, and take corrective action. Demonstrate the ability to weld in the overhead position.
MEETS STANDARD	<p>6.3.1 Select and safely operate SMAW equipment used to complete assigned projects.</p> <p>6.3.2 Select appropriate electrodes to complete assignments.</p> <p>6.3.3 Demonstrate proper selection and use of ventilation.</p> <p>6.3.4 Demonstrate proper use of personal respiration.</p> <p>6.3.5 Demonstrate proper cleaning and joint preparation.</p> <p>6.3.6 Demonstrate striking an arc and running a bead.</p> <p>6.3.7 Demonstrate the ability to weld in the flat, horizontal, and vertical positions to complete an assigned project.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> List SMAW equipment. Observe SMAW video and/or demonstration. List and draw the five (5) welding joints. List the four (4) welding positions.

Nevada Academic Standards Correlation:
 Science: 24.12.1

Content and Performance Standards
Gas Metal Arc Welding

Content Standard 7.0: Students will identify, select, setup, and demonstrate the use of Gas Metal Arc Welding (GMAW) equipment.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 7.1 The student will demonstrate safety procedures and describe the electrical theory of GMAW.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate GMAW safety techniques to peers. • Identify GMAW safety problems, their causes, and take corrective action.
MEETS STANDARD	<p>7.1.1 Identify, list, and evaluate safety concerns common to the GMAW process.</p> <p>7.1.2 Identify the different components of electricity and how they relate to the welding process.</p> <p>7.1.3 Identify the polarities, wire feed speeds, and voltages used in GMAW.</p> <p>7.1.4 Identify and explain the different types of power sources used.</p> <p>7.1.5 Identify and report potential electrical safety hazards.</p> <p>7.1.6 Differentiate between metal transfer methods.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List GMAW equipment. • Observe GMAW video and/or demonstration. • List five (5) GMAW safety concerns. • List personal safety gear required for GMAW.

Nevada Academic Standards Correlation:
Science: 1.12.5, 3.12.4, 24.12.1

Content and Performance Standards
Gas Metal Arc Welding

Content Standard 7.0: Students will identify, select, setup, and demonstrate the use of Gas Metal Arc Welding (GMAW) equipment.

Performance Standard 7.2 The student will be able to select and setup the appropriate equipment and consumables used in GMAW.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate GMAW techniques to peers. • Identify GMAW problems, their causes, and take corrective action.
MEETS STANDARD	<p>7.2.1 Identify, select, and setup GMAW equipment.</p> <p>7.2.2 Select appropriate wire, size, and type to complete assignments.</p> <p>7.2.3 Select appropriate voltage and wire feed speed settings to complete assignment.</p> <p>7.2.4 Demonstrate proper maintenance for wire delivery systems.</p> <p>7.2.5 Select appropriate gas and flow rate to complete assignment.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List GMAW equipment. • Observe GMAW video and/or demonstration.

Nevada Academic Standards Correlation:
 Science: 24.12.3

Content and Performance Standards
Gas Metal Arc Welding

Content Standard 7.0: Students will identify, select, setup, and demonstrate the use of Gas Metal Arc Welding (GMAW) equipment.

Performance Standard 7.3 The student will demonstrate GMAW using appropriate safety techniques.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate GMAW techniques to peers. • Identify GMAW problems, their causes, and take corrective action. • Demonstrate the ability to weld in the overhead position.
MEETS STANDARD	<p>7.3.1 Select and safely operate GMAW equipment used to complete assigned projects.</p> <p>7.3.2 Select appropriate wire to complete assignments.</p> <p>7.3.3 Demonstrate proper selection and use of ventilation.</p> <p>7.3.4 Demonstrate proper use of personal respiration.</p> <p>7.3.5 Demonstrate proper cleaning and joint preparation.</p> <p>7.3.6 Demonstrate starting an arc and running a bead.</p> <p>7.3.7 Demonstrate the ability to weld in the flat, horizontal, and vertical positions to complete an assigned project.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List GMAW equipment. • Observe GMAW video and/or demonstration. • List and draw the five (5) welding joints. • List the four (4) welding positions.

Nevada Academic Standards Correlation:
 Science: 24.12.1

Content and Performance Standards
Flux Core Arc Welding

Content Standard 8.0: Students will identify, select, setup, and demonstrate the use of Flux Core Arc Welding (FCAW) equipment.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 8.1 The student will demonstrate safety procedures and describe the electrical theory of FCAW.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate FCAW safety techniques to peers. • Identify FCAW safety problems, their causes, and take corrective action.
MEETS STANDARD	<p>8.1.1 Identify, list and evaluate safety concerns common to the FCAW process.</p> <p>8.1.2 Identify the different components of electricity and how they relate to the FCAW process.</p> <p>8.1.3 Identify the polarities and currents used in FCAW.</p> <p>8.1.4 Identify and explain the different types of power sources used.</p> <p>8.1.5 Identify and report potential electrical safety hazards.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List FCAW equipment. • Observe FCAW video and/or demonstration. • List five (5) FCAW safety concerns. • List personal safety gear required for FCAW.

Nevada Academic Standards Correlation:
 Science: 1.12.5, 3.12.4, 24.12.1

Content and Performance Standards
Flux Core Arc Welding

Content Standard 8.0: Students will identify, select, setup, and demonstrate the use of Flux Core Arc Welding (FCAW) equipment.

Performance Standard 8.2 The student will be able to select and setup the appropriate equipment and consumables used in FCAW.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate FCAW techniques to peers. • Identify FCAW problems, their causes, and take corrective action. • Select appropriate gasses for dual shield FCAW.
MEETS STANDARD	<p>8.2.1 Identify, select, and safely setup FCAW equipment.</p> <p>8.2.2 Select appropriate polarity and current settings.</p> <p>8.2.3 Select appropriate wire, size, and type, to complete assignments.</p> <p>8.2.4 Select appropriate voltage and wire feed speed settings.</p> <p>8.2.5 Demonstrate proper maintenance for wire delivery systems.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List FCAW equipment. • Observe FCAW video and/or demonstration.

Nevada Academic Standards Correlation:
 Science: 3.12.4, 24.12.1, 24.12.3

Content and Performance Standards
Flux Core Arc Welding

Content Standard 8.0: Students will identify, select, setup, and demonstrate the use of Flux Core Arc Welding (FCAW) equipment.

Performance Standard 8.3 The student will demonstrate FCAW using appropriate safety techniques.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate FCAW techniques to peers. • Identify FCAW problems, their causes, and take corrective action. • Demonstrate the ability to weld in the overhead position.
MEETS STANDARD	<p>8.3.1 Select and safely operate FCAW equipment used to complete assigned projects.</p> <p>8.3.2 Demonstrate proper selection and use of ventilation.</p> <p>8.3.3 Demonstrate proper use of personal respiration.</p> <p>8.3.4 Demonstrate proper cleaning and joint preparation.</p> <p>8.3.5 Demonstrate starting an arc and running a bead.</p> <p>8.3.6 Demonstrate the ability to weld in the flat, horizontal, and vertical positions to complete an assigned project.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List FCAW equipment. • Observe FCAW video and/or demonstration. • List and draw the five (5) welding joints. • List the four (4) welding positions.

Nevada Academic Standards Correlation:
 Science: 24.12.1

Content and Performance Standards
Gas Tungsten Arc Welding

Content Standard 9.0: Students will identify, select, setup, and demonstrate the use of Gas Tungsten Arc Welding (GTAW) equipment.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 9.1 The student will demonstrate safety procedures and describe the electrical theory of GTAW.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate GTAW safety techniques to peers. • Identify GTAW safety problems, their causes, and take corrective action.
MEETS STANDARD	9.1.1 Identify, list, and evaluate safety concerns common to the GTAW process. 9.1.2 Identify the different components of electricity and how they relate to the GTAW process. 9.1.3 Identify the polarities, currents, and modes of high frequencies used in GTAW. 9.1.4 Identify and explain the different types of power sources used. 9.1.5 Identify and report potential electrical safety hazards.
APPROACHES STANDARD	<ul style="list-style-type: none"> • List GTAW equipment. • Observe GTAW video and/or demonstration. • List five (5) GTAW safety concerns. • List personal safety gear required for GTAW.

Nevada Academic Standards Correlation:
 Science: 1.12.5, 3.12.4, 24.12.1, 24.12.3

Content and Performance Standards
Gas Tungsten Arc Welding

Content Standard 9.0: Students will identify, select, setup, and demonstrate the use of Gas Tungsten Arc Welding (GTAW) equipment.

Performance Standard 9.2 The student will be able to select and setup the appropriate equipment and consumables used in GTAW.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate GTAW techniques to peers. • Identify GTAW problems, their causes, and take corrective action.
MEETS STANDARD	9.2.1 Identify, select, and safely setup GTAW equipment. 9.2.2 Select appropriate electrodes to complete assignments. 9.2.3 Identify proper electrode preparation. 9.2.4 Select appropriate polarity and current settings. 9.2.5 Select appropriate filler material, size and type, to complete assignments. 9.2.6 Select appropriate current and high frequency mode. 9.2.7 Select appropriate gas, flow rate, and post flow.
APPROACHES STANDARD	<ul style="list-style-type: none"> • List GTAW equipment. • Observe GTAW video and/or demonstration.

Nevada Academic Standards Correlation:
 Science: 3.12.4, 24.12.1, 24.12.3

Content and Performance Standards
Gas Tungsten Arc Welding

Content Standard 9.0: Students will identify, select, setup, and demonstrate the use of Gas Tungsten Arc Welding (GTAW) equipment.

Performance Standard 9.3 The student will demonstrate GTAW using appropriate safety techniques.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate GTAW techniques to peers. • Identify GTAW problems, their causes, and take corrective action. • Demonstrate the ability to weld in the overhead position.
MEETS STANDARD	<p>9.3.1 Select and safely operate GTAW equipment used to complete assigned projects.</p> <p>9.3.2 Demonstrate proper selection and use of ventilation.</p> <p>9.3.3 Demonstrate proper use of personal respiration.</p> <p>9.3.4 Demonstrate proper cleaning and joint preparation.</p> <p>9.3.5 Demonstrate starting an arc and running a bead.</p> <p>9.3.6 Demonstrate the ability to weld in the flat, horizontal, and vertical positions to complete an assigned project.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List GTAW equipment. • Observe GTAW video and/or demonstration. • List and draw the five (5) welding joints. • List the four (4) welding positions.

Nevada Academic Standards Correlation:
 Science: 24.12.1

Content and Performance Standards
Plasma Arc Cutting

Content Standard 10.0: Students will identify, select, setup, and demonstrate the use of Plasma Arc Cutting equipment.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 10.1 The student will demonstrate safety procedures and describe the electrical theory of Plasma Arc Cutting.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate Plasma Arc Cutting safety techniques to peers. • Identify Plasma Arc Cutting safety problems, their causes, and take corrective action.
MEETS STANDARD	10.1.1 Identify, list, and evaluate safety concerns common to the Plasma Arc Cutting process. 10.1.2 Identify the different components of plasma and how they relate to the Plasma Arc Cutting process. 10.1.3 Identify and explain the type of power source used. 10.1.4 Identify and report potential electrical safety hazards.
APPROACHES STANDARD	<ul style="list-style-type: none"> • List Plasma Arc Cutting equipment. • Observe Plasma Arc Cutting video and/or demonstration. • List five (5) Plasma Arc Cutting safety concerns. • List personal safety gear required for Plasma Arc Cutting.

Nevada Academic Standards Correlation:
 Science: 1.12.5, 24.12.1

Content and Performance Standards
Plasma Arc Cutting

Content Standard 10.0: Students will identify, select, setup, and demonstrate the use of Plasma Arc Cutting equipment.

Performance Standard 10.2	The student will be able to select and setup the appropriate equipment and consumables used in Plasma Arc Cutting.
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate Plasma Arc Cutting techniques to peers. • Identify Plasma Arc Cutting problems, their causes, and take corrective action.
MEETS STANDARD	<p>10.2.1 Identify, select, and safely setup Plasma Arc Cutting equipment.</p> <p>10.2.2 Select appropriate nozzles and current setting to complete assignments.</p> <p>10.2.3 Identify proper sequence for assembling Plasma torch components.</p> <p>10.2.4 Select appropriate flow rate for compressed air.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List Plasma Arc Cutting equipment. • Observe Plasma Arc Cutting video and/or demonstration.

Nevada Academic Standards Correlation:
 Science: 24.12.1, 24.12.3

Content and Performance Standards
Plasma Arc Cutting

Content Standard 10.0: Students will identify, select, setup, and demonstrate the use of Plasma Arc Cutting equipment.

Performance Standard 10.3	The student will setup and demonstrate Plasma Arc Cutting techniques.
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Model appropriate Plasma Arc Cutting techniques to peers. • Identify Plasma Arc Cutting problems, their causes, and take corrective action.
MEETS STANDARD	<p>10.3.1 Select and safely operate Plasma Arc Cutting equipment used to complete assigned projects.</p> <p>10.3.2 Select appropriate nozzles and air pressure to complete assignments.</p> <p>10.3.3 Demonstrate proper selection and use of ventilation.</p> <p>10.3.4 Demonstrate proper use of personal respiration.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List Plasma Arc Cutting equipment. • Observe Plasma Arc Cutting video and/or demonstration.

Nevada Academic Standards Correlation:
 Science: 24.12.1, 24.12.3

Content and Performance Standards
Fabrication

Content Standard 11.0: Students will identify tools, equipment, and demonstrate fabrication techniques.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 11.1	The student will identify and demonstrate the use of fabrication techniques and equipment while planning, designing, laying out, and constructing projects.
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Perform weldments in the proper sequence.
MEETS STANDARD	11.1.1 Demonstrate the ability to construct projects in a proper sequence. 11.1.2 Demonstrate the ability to tack metal together to specification. 11.1.3 Demonstrate the ability to layout projects to blue prints. 11.1.4 Demonstrate the ability to cut miter joints to specific angles. 11.1.5 Demonstrate the ability to check work for accuracy. 11.1.6 Demonstrate the ability to safely use tools, including but not limited to: band saws, chop saws, grinders, drills, torches, and clamping devices. 11.1.7 Demonstrate safe handling of long and/or heavy objects. 11.1.8 Demonstrate the ability to de-burr sharp edges.
APPROACHES STANDARD	<ul style="list-style-type: none"> • List the steps to assure accurate layout. • List steps to layout miter cuts. • Compute miter cut angles.

Nevada Academic Standards Correlation:
 Math: 3.12.2, 3.12.3, 3.12.5
 Science: 24.12.1

Content and Performance Standards
Weld Testing

Content Standard 12.0: Students will identify defects and take corrective action based on non-destructive and destructive weld testing.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye and hearing protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 12.1 The student will identify and perform non-destructive weld testing techniques.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Identify defects and take corrective action on the non-destructive test.
MEETS STANDARD	12.1.1 Prepare a sample for a non-destructive test. 12.1.2 Inspect for undercutting, overlap, porosity, slag, spatter, and surface cracks. 12.1.3 Identify and list several of the non-destructive examination processes.
APPROACHES STANDARD	<ul style="list-style-type: none"> • List the non-destructive weld defects

Content and Performance Standards
Weld Testing

Content Standard 12.0: Students will identify defects and take corrective action based on non-destructive and destructive weld testing.

Performance Standard 12.2 The student will identify and perform destructive weld testing techniques.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Determine weld defects and take corrective action based on destructive test.
MEETS STANDARD	12.2.1 Prepare a coupon for destructive test. 12.2.2 Perform a destructive test on weld coupon.
APPROACHES STANDARD	<ul style="list-style-type: none"> • List destructive weld defects.

Content and Performance Standards
Employability Skills

Content Standard 13.0: Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 13.1 The student will demonstrate problem-solving skills.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Develop methods to analyze the advantages and disadvantages of alternative solutions. • Devise an action plan for a welding problem based on information gained through research of alternative solutions and implement in a group decision/action.
MEETS STANDARD	<p>13.1.1 Solve a welding problem using the appropriate steps in the problem-solving process.</p> <p>13.1.2 Demonstrate brainstorming techniques.</p> <p>13.1.3 Examine and explain the advantages and disadvantages of alternative solutions to one or more problems.</p> <p>13.1.4 Create an action plan based upon a solution to a welding problem.</p> <p>13.1.5 Identify the benefits of solving a welding problem.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Identify the basic steps in the problem-solving process. • Identify alternative solutions to a problem. • Identify the basic components of an action plan.

Nevada Academic Standards Correlation:

English: 10.12.2, 10.12.3

Content and Performance Standards
Employability Skills

Content Standard 13.0: Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 13.2 The student will demonstrate critical-thinking skills.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Analyze how critical-thinking skills affect work performance. • Formulate, implement, and evaluate an action plan. • Demonstrate the skills necessary to identify, analyze, and solve a design problem.
MEETS STANDARD	<p>13.2.1 Identify and explain the essential elements of the critical-thinking process as related to the welding trades.</p> <p>13.2.2 Demonstrate critical-thinking skills necessary in the welding trades.</p> <p>13.2.3 Explain how emotional thinking and logical thinking affect decision making in the welding trades.</p> <p>13.2.4 Explain the difference between reliable and unreliable observations and statements of fact.</p> <p>13.2.5 Recognize patterns or relationships through observation and discovery.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • State the importance of critical thinking in identifying, analyzing, and solving a welding problem. • Identify the essential steps of critical thinking. • Define emotional and logical thinking. • Identify the difference between opinions and statements of fact.

Nevada Academic Standards Correlation:
 English: 10.12.1

Content and Performance Standards
Employability Skills

Content Standard 13.0: Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 13.3 The student will demonstrate the ability to speak, write, and listen effectively.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Identify, research, prepare and deliver a welding-related presentation. • Prepare technical documents relating to bill of materials, blueprints, etc. • Present and defend a welding procedure. • Compete in a SkillsUSA job skill demonstration and/or public speaking contest.
MEETS STANDARD	<p>13.3.1 Explain the benefits of effective communication skills in the workplace.</p> <p>13.3.2 Effectively interpret and respond to verbal and nonverbal messages.</p> <p>13.3.3 Demonstrate proper telephone etiquette.</p> <p>13.3.4 Effectively communicate thoughts, ideas and information in writing.</p> <p>13.3.5 Organize ideas and communicate orally; is able to effectively demonstrate job skills to others.</p> <p>13.3.6 Locate, understand and interpret written information in documents such as manuals, graphs and schedules.</p> <p>13.3.7 Select and utilize an appropriate medium for conveying messages with dignity and respect.</p> <p>13.3.8 Organize information into the appropriate format in accordance with standard practices, which includes prewriting, drafting, proofreading, editing/revising, and preparing final copy.</p> <p>13.3.9 Demonstrate sensitivity to cultural diversity in communication.</p> <p>13.3.10 Identify common communication barriers and methods for improving communication.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Define communications. • Explain the benefits of effective communication in the welding trade. • Explain how cultural and physical diversity affect communication. • Identify applicable medium for conveying messages.

Nevada Academic Standards Correlation:
English: 4.12.6, 6.12.5, 7.12.1, 7.12.3, 7.12.4, 7.12.5

Content and Performance Standards
Employability Skills

Content Standard 13.0: Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 13.4 The student will demonstrate the ability to select, apply, and maintain appropriate technology.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Critique the use, benefits and cost of technologically advanced equipment in the welding trade. • Analyze the impact of technological changes on one or more aspects of welding trades by researching current literature. • Compete in a state-level SkillsUSA welding contest.
MEETS STANDARD	<p>13.4.1 Demonstrate ability to utilize basic keyboarding techniques.</p> <p>13.4.2 Demonstrate ability to utilize other input devices.</p> <p>13.4.3 Demonstrate ability to utilize various electronic research methods.</p> <p>13.4.4 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).</p> <p>13.4.5 Investigate and explain the use, benefits, and costs of technological developments in the workplace and school.</p> <p>13.4.6 Identify and demonstrate the appropriate use of technology to enhance the efficiency of the workplace and school.</p> <p>13.4.7 Demonstrate routine maintenance and repair of technological equipment.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Recognize technology used in the welding trade. • Use an Internet browser to locate specific Websites related to welding trades.

Nevada Academic Standards Correlation:
Math: 3.12.4

Content and Performance Standards
Employability Skills

Content Standard 13.0: Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 13.5 The student will demonstrate leadership and teamwork skills.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Analyze the stages of group development. • Demonstrate leadership ability within a group or team. • Compromise and/or build consensus within a group and summarize the decision of the group while maintaining respect for diverse viewpoints. • Complete levels 1-3 of the SkillsUSA Professional Development Program. • Campaign for a local SkillsUSA chapter office. • Serve as a committee chair in a local SkillsUSA chapter.
MEETS STANDARD	<p>13.5.1 Work cooperatively with others when given group project.</p> <p>13.5.2 Explain traits necessary to effectively lead and influence individuals and groups.</p> <p>13.5.3 Demonstrate appropriate attitudes and behaviors for effective leadership.</p> <p>13.5.4 Demonstrate respect for team members, team processes, and team goals.</p> <p>13.5.5 Participate in the implementation of a group’s decision and evaluate the results.</p> <p>13.5.6 Demonstrate the qualities of an effective leader and team member.</p> <p>13.5.7 Describe the importance of a proper dress code.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Explain the importance of groups. • Explain how to organize groups. • Wear appropriate attire.

Content and Performance Standards
Employability Skills

Content Standard 13.0: Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 13.6 The student will demonstrate sound workplace ethics.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Demonstrate time-management skills and cost-effective practices.
MEETS STANDARD	<p>13.6.1 Develop personal work ethics through work experience.</p> <p>13.6.2 Describe the importance of ethics practiced in the workplace.</p> <p>13.6.3 Demonstrate regular attendance, promptness, and the willingness to follow instructions and complete an assigned task.</p> <p>13.6.4 Demonstrate appropriate personal and professional attitudes and behaviors.</p> <p>13.6.5 Maintain a safe, clean, and organized work area.</p> <p>13.6.6 Demonstrate awareness of legal responsibilities related to individual performance, safety, and customer satisfaction.</p> <p>13.6.7 Demonstrate knowledge of various types of harassment.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List the important ethics in the workplace. • Meet attendance standards. • Describe an organized workplace. • Identify appropriate responses to unethical actions.

Content and Performance Standards
Employability Skills

Content Standard 13.0: Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 13.7 The student will demonstrate the ability to effectively manage resources in high-performance workplaces.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Recognize the individual roles of team members, delegate tasks, and provide feedback on performance. • Acknowledge and utilize the skills, abilities, and input of all members of a team. • Develop an action plan to accomplish tasks within a given time frame.
MEETS STANDARD	<p>13.7.1 Develop a time schedule and prioritized task list to complete a job assignment.</p> <p>13.7.2 Identify the resources needed to complete a job assignment.</p> <p>13.7.3 Organize the material resources and space requirements needed to complete a job assignment.</p> <p>13.7.4 Effectively use technology to complete a job assignment.</p> <p>13.7.5 Demonstrate cooperation and leadership as a team at school or in a workplace setting.</p> <p>13.7.6 Use the basic components of effective time management.</p> <p>13.7.7 Recognize the need for management skills in the workplace with regard to stress, anger management, and substance abuse.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • List effective time management skills. • Use technology to complete assignments. • Utilize materials, tools, and processes to complete a task related to a career selection. • Read and follow instructions from manuals on the use and care of materials, tools, and equipment. • Maintain a clean, organized, and safe job site. • Identify traits needed for cooperation and leadership in a team at school or in a workplace setting. • Identify the material resources and space requirements needed to complete an assignment.

Content and Performance Standards
Employability Skills

Content Standard 13.0: Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 13.8 The student will demonstrate career planning and development skills.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Develop a community service or job-shadowing project. • Develop an education/training plan to fulfill long-term career goals. • Define advantages and disadvantages of self-employment or working for various sizes and types of businesses. • Critique results of a job interview. • Develop a proposal for an organized community service project. • Compete in a state level SkillsUSA job interview contest.
MEETS STANDARD	<p>13.8.1 Prepare a job application.</p> <p>13.8.2 Prepare a personal resume.</p> <p>13.8.3 Complete a personal aptitude and interest inventory.</p> <p>13.8.4 Participate in a mock job interview.</p> <p>13.8.5 Establish short-term career goals.</p> <p>13.8.6 Establish long-term career goals.</p> <p>13.8.7 Use the Nevada Career Information System (NCIS) or a similar computer-based program to research careers in a chosen field.</p> <p>13.8.8 Participate in an organized job-shadowing activity.</p> <p>13.8.9 Participate in a community service project.</p> <p>13.8.10 Construct a career portfolio.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Locate employment opportunities. • Identify job requirements for entry-level positions in the welding industry. • Identify general conditions for employment. • Identify educational/training requirements for related welding fields. • Identify the elements of goal setting. • Identify welding-related careers. • Describe essential job interview skills. • Identify the components of a career portfolio.

Nevada Academic Standards Correlation:

English: 5.12.5, 6.12.5, 7.12.1, 7.12.3, 7.12.4, 7.12.5, 9.12.1

Content and Performance Standards
Employability Skills

Content Standard 13.0: Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 13.9 The student will demonstrate job-retention and lifelong-learning skills.	
EXCEEDS STANDARD	<ul style="list-style-type: none"> • Maintain an electronic portfolio. • Create a plan for lifelong learning. • Create a presentation illustrating interpersonal skills needed for job retention. • Adapt new knowledge and skills in changing situations. • Analyze how work life is affected by families and how families are affected by work life.
MEETS STANDARD	<p>13.9.1 Maintain an employment/career portfolio.</p> <p>13.9.2 Explain strategies for balancing work and family roles.</p> <p>13.9.3 Demonstrate understanding of the need for lifelong learning in a rapidly changing job market.</p> <p>13.9.4 Describe strategies to maintain employment in the face of job reductions.</p> <p>13.9.5 Develop long-term career planning strategies.</p> <p>13.9.6 Describe various educational options needed for job retention.</p> <p>13.9.7 Model sound workplace ethics, such as loyalty, punctuality, and initiative.</p> <p>13.9.8 Demonstrate interpersonal skills needed for job retention.</p>
APPROACHES STANDARD	<ul style="list-style-type: none"> • Describe the importance of a portfolio. • Identify options for lifelong learning. • Identify interpersonal skills needed for job retention. • Identify jobs with opportunity for advancement. • Describe the importance of career planning.

**CROSSWALK OF WELDING STANDARDS
AND ACADEMIC STANDARDS**

Content Standard 1.0: Students shall demonstrate safe work practices while performing operations in the welding lab.

Performance Indicators	Academic Standards
1.1.2	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards. 24.12.2 Use the information found in materials safety data sheets to handle, store, and dispose of chemicals properly.
1.1.3, 1.1.4	Science 20.12.5 Identify the type of hazard, estimate the extent and consequences of exposure, and determine the options for reducing or eliminating risks.
1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
1.2.1 - 1.2.6	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
1.2.7	Science 24.12.2 Use the information found in materials safety data sheets to handle, store, and dispose of chemicals properly.

Content Standard 2.0: Students will demonstrate proper use of layout tools/measuring tools and techniques that are commonly found in the welding lab.

Performance Indicators	Academic Standards
2.1.1, 2.1.2	Math 3.12.2 Select and use measurement tools, techniques, and formulas to calculate and compare rates, cost, distances, interest, temperatures, and weight/mass. 3.12.3 Distinguish and differentiate among the structures, language and uses of systems of measures (e.g., linear, square units, cubic units); justify and communicate the differences between accuracy, precision, error, and tolerance in measurement; describe how each of these can affect solutions found in problem situations.
2.2.1, 2.2.3	Math 3.12.2 Select and use measurement tools, techniques, and formulas to calculate and compare rates, cost, distances, interest, temperatures, and weight/mass. 3.12.3 Distinguish and differentiate among the structures, language and uses of systems of measures (e.g., linear, square units, cubic units); justify and communicate the differences between accuracy, precision, error, and tolerance in measurement; describe how each of these can affect solutions found in problem situations.
2.3.1	Math 3.12.3 Distinguish and differentiate among the structures, language and uses of systems of measures (e.g., linear, square units, cubic units); justify and communicate the differences among accuracy, precision, error, and tolerance in measurement; describe how each of these can affect solutions found in problem situations.
2.3.3	Math 1.12.1 Calculate and estimate sums, differences, products, quotients, powers , and roots using mental math, formulas , and algorithms .

Performance Indicators	Academic Standards
2.4.1, 2.4.2	Math 1.12.1 Calculate and estimate sums, differences, products, quotients, powers , and roots using mental math, formulas , and algorithms . 1.12.3 Apply the properties and theories of the real number system to everyday situations.
2.4.3	Math 3.12.3 Distinguish and differentiate among the structures, language and uses of systems of measures (e.g., linear, square units, cubic units); justify and communicate the differences among accuracy, precision, error, and tolerance in measurement; describe how each of these can affect solutions found in problem situations. 3.12.5 Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes to solve problems.
2.4.4	Math 1.12.1 Calculate and estimate sums, differences, products, quotients, powers , and roots using mental math, formulas , and algorithms .

Content Standard 3.0: Students will identify the classification and physical properties of different types of metals common to the welding industry.

Performance Indicators	Academic Standards
3.1.1, 3.1.2, 3.1.3, 3.1.4	Science 2.12.1 Investigate and describe intrinsic (color, odor, density) and extrinsic (e.g., size, mass, volume) physical properties of matter.
3.1.5	Math 3.12.2 Select and use measurement tools, techniques, and formulas to calculate and compare rates, cost, distances, interest, temperatures, and weight/mass.
3.2.1	Science 3.12.1 Explain that the transformation of energy usually results in some energy in the form of heat, which spreads by radiation, conduction, and sometimes convection into cooler places.
3.2.2, 3.2.3	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
3.2.4	Science 3.12.1 Explain that the transformation of energy usually results in some energy in the form of heat, which spreads by radiation, conduction, and sometimes convection into cooler places.

Content Standard 4.0: Students will safely operate commonly used welding machines and tools.

Performance Indicators	Academic Standards
4.1.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
4.2.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
4.3.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.

Content Standard 5.0: Students will identify, select, setup, and demonstrate the use of oxy-fuel welding and cutting equipment.

Performance Indicators	Academic Standards
5.1.1, 5.1.2, 5.1.3, 5.1.4	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
5.2.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
5.2.2	Math 3.12.2 Select and use measurement tools, techniques, and formulas to calculate and compare rates, cost, distances, interest, temperatures, and weight/mass. 3.12.3 Distinguish and differentiate among the structures, language and uses of systems of measures (e.g., linear, square units, cubic units); justify and communicate the differences between accuracy, precision, error, and tolerance in measurement; describe how each of these can affect solutions found in problem situations. 4.12.7 Apply the Pythagorean Theorem, its converse , properties of special right triangles, and right triangle trigonometry to solve practical problems.
5.2.3, 5.2.4, 5.2.5	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
5.2.6	Science 24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.
5.3.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
5.3.2	Math 3.12.2 Select and use measurement tools, techniques, and formulas to calculate and compare rates, cost, distances, interest, temperatures, and weight/mass. 3.12.3 Distinguish and differentiate among the structures, language and uses of systems of measures (e.g., linear, square units, cubic units); justify and communicate the differences between accuracy, precision, error, and tolerance in measurement; describe how each of these can affect solutions found in problem situations. 4.12.7 Apply the Pythagorean Theorem, its converse , properties of special right triangles, and right triangle trigonometry to solve practical problems.
5.3.4, 5.3.4, 5.3.5	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
5.3.6	Science 24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.
5.3.6, 5.3.7	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
5.4.1	Science 24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.
5.4.3, 5.4.4, 5.4.6	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
5.4.7, 5.4.8	Science 24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.

Content Standard 6.0: Students will identify, select, setup, and demonstrate the use of Shielded Metal Arc Welding (SMAW) equipment.

Performance Indicators	Academic Standards
6.1.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
6.1.2, 6.1.3	Science 3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.
6.1.4	Science 1.12.5 Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single electromagnetic force. (e.g., electric motors, generators, radios).
6.1.5	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
6.2.1	Science 24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.
6.2.4	Science 3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.
6.3.1, 6.3.3, 6.3.4	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.

Content Standard 7.0: Students will identify, select, setup, and demonstrate the use of Gas Metal Arc Welding (GMAW) equipment.

Performance Indicators	Academic Standards
7.1.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
7.1.2, 7.1.3	Science 3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.
7.1.4	Science 1.12.5 Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single electromagnetic force. (e.g., electric motors, generators, radios).
7.1.5	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
7.2.1	Science 24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.
7.3.1, 7.3.3, 7.3.4	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.

Content Standard 8.0: Students will identify, select, setup, and demonstrate the use of Flux Core Arc Welding (FCAW) equipment.

Performance Indicators	Academic Standards
8.1.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
8.1.2, 8.1.3	Science 3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.
8.1.4	Science 1.12.5 Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single electromagnetic force. (e.g., electric motors, generators, radios).
8.1.5	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
8.2.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
8.2.2, 8.2.4	Science 3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.
8.2.5	Science 24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.
8.3.1, 8.3.2, 8.3.3	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.

Content Standard 9.0: Students will identify, select, setup, and demonstrate the use of Gas Tungsten Arc Welding (GTAW) equipment.

Performance Indicators	Academic Standards
9.1.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
9.1.2, 9.1.3	Science 3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.
9.1.4	Science 1.12.5 Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single electromagnetic force. (e.g., electric motors, generators, radios).
9.1.5	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
9.2.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
9.2.4, 9.2.6	Science 3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.

Performance Indicators	Academic Standards
9.2.7	Science 24.12.3 Inspect, manipulate, and describe the functions of various parts of technical, and scientific equipment.
9.3.1, 9.3.2, 9.3.3	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.

Content Standard 10.0: Students will identify, select, setup, and demonstrate the use of Plasma Arc Cutting equipment.

Performance Indicators	Academic Standards
10.1.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
10.1.3	Science 1.12.5 Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single electromagnetic force. (e.g., electric motors, generators, radios).
10.1.4	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
10.2.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
10.2.2, 10.2.3, 10.2.4	Science 24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.
10.3.1	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.
10.3.2, 10.3.3	Science 24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.
10.3.4	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.

Content Standard 11.0: Students will identify tools, equipment, and demonstrate fabrication techniques.

Performance Indicators	Academic Standards
11.1.3, 11.1.4, 11.1.5	Math 3.12.2 Select and use measurement tools, techniques, and formulas to calculate and compare rates, cost, distance, interest, temperatures, and weight/mass. 3.12.3 Distinguish and differentiate among the structures, language and uses of systems of measures (e.g., linear, square units, cubic units); justify and communicate the differences among accuracy, precision, error, and tolerance in measurement; describe how each of these can affect solutions found in problem situations. 3.12.5 Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes to solve problems.
11.1.6, 11.1.7	Science 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.

Content Standard 13.0: Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Indicators	Academic Standards
13.1.1, 13.2	English 10.12.2 Negotiate to arrive at consensus by proposing and examining possible options. 10.12.3 Identify and practice techniques such as setting time limits for speakers and deadlines for decision making to improve productivity of group discussion.
13.2.2	English 10.12.1 Participate in problem-solving conversations or group discussions by identifying, synthesizing, and evaluating data.
13.3.6	English 4.12.6 Read and apply multi-step directions in order to perform complex procedures and tasks.
13.3.8	English 6.12.5 Edit for use of standard English. 7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing. 7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing. 7.12.4 Use rules of capitalization. 7.12.5 Demonstrate conventional spelling.
13.8.1	English 6.12.5 Edit for use of standard English.
13.8.2	English 7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing. 7.12.5 Demonstrate conventional spelling. 9.12.1 Use specific and varied vocabulary and apply standard English to communicate ideas.
13.8.3	English 5.12.5 Write summaries or abstracts that distill large amounts of information into clear, concise prose. 7.12.4 Use rules of capitalization.
13.8.4	English 7.12.5 Demonstrate conventional spelling. 9.12.1 Use specific and varied vocabulary and apply standard English to communicate ideas.
13.8.5, 13.8.6	English 7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing. 7.12.5 Demonstrate conventional spelling. 9.12.1 Use specific and varied vocabulary and apply standard English to communicate ideas.