Curriculum: Welding I and II

Curricular Unit: Essential Skills

Instructional Unit: A. Development of welding processes

Standard Alignments (Section 2)

SSCLE: RIGIT.6.M
Knowledge: (CA) 1,3,6 (SS) 5,6
CCSS: 11-12.SL.1; 11-12.RST.3; 11-12.RST.4; 11-12.WHST.4
NETS: 1d
Performance: 2.6, 4.3

Unit (Section 3)

Learning Targets:

- List common types and applications of welding processes
- Describe common training requirements for welders
- Identify common classifications of welders

Instructional Strategies:

- Content is introduced with a teacher-guided lecture/discussion:
  - Classroom discussions: Participate effectively in a range of collaborative discussions
  - Student note taking: Students summarize and organize information in a note-taking activity
- Student activities (Textbook Ch. 1 – *An Essential Skill*):
  - Read Chapter 1: Determine a central idea of a text
  - Class discussion: "Questions for Study and Discussion" on page 8

Assessments/Evaluations:

- Formative:
  - Workbook assignment: Ch. 1 – *An Essential Skill*, pgs. 1-4
  - Oral quiz
- Summative test – evaluated using a scoring guide

Sample Assessment Questions:

- (Shielded Metal) Arc welding does not require external shielding gas, which makes it more portable than other welding processes. (T/F)

Instructional Resources/Tools:

- Textbook: "*Welding Skills, 5th Edition*" by B.J. Moniz, American Technical Publishers, Inc., © 2015
- Workbook: "*Welding Skills Workbook, 5th Edition*" by Jonathon F. Gosse, American Technical Publishers, Inc., © 2015
- Whiteboard: Used as a projector board and drawing board

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• Media equipment:
  • Newspaper/welding magazines
  • Videos
  • Slides

Cross Curricular Connections: • Social Studies: Job placement according to geographical regions and market

Depth of Knowledge (Section 5)

DOK: 2

Curriculum: Welding I and II

Curricular Unit: Welding Safety

Instructional Unit: B. Shop and personal safety

Standard Alignments (Section 2)

HECLE: HME.4.A
PEGLE: PALW.3.B
Knowledge: (H/PE) 6,7
CCSS: 11-12.SL.1; 11-12.RST.3; 11-12.RST.4; 11-12.WHST.4
NETS: 1c
Performance: 3.1, 4.7

Unit (Section 3)

Learning Targets:

- Demonstrates proper use and inspection of personal protection equipment (PPE)
- **Demonstrates proper safe operation practices in work area**
- Demonstrates proper use and inspection of ventilation equipment
- Demonstrates proper Hot Zone operation
- Demonstrates proper work actions for working in confined spaces
- Demonstrates proper use of precautionary labeling and MSDS information
- Demonstrates proper inspection and operation of equipment used for each welding and thermal cutting process used. (This is best done as a part of the process module/unit for each of the required welding or thermal cutting processes)

Instructional Strategies:

- Content is introduced with a teacher-guided lecture/discussion:
  - Classroom discussions:
    - Participate effectively in a range of collaborative discussions
    - Differentiate between life threatening and non-life threatening injuries and select the appropriate level of treatment
  - Student note taking: Students summarize and organize information in a note-taking activity
- Student activities (Textbook Ch. 2 – *Welding Safety*):
  - Read Chapter 2: Determine a central idea of a text
  - Class discussion: "Questions for Study and Discussion" on page 30
- Teacher models/demonstrates proper safety procedures
- Students model/demonstrate proper safety procedures

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- Proper safety procedures viewed on video clips and/or slides: Differentiate between life threatening and non-life threatening injuries and select the appropriate level of treatment

Assessments/Evaluations:

- Formative:
  - Workbook assignment: Ch. 2 – *An Essential Skill*, pgs. 5-8
  - Oral quiz
- Summative safety test – evaluated using a scoring guide
- Student demonstration of proper safety procedures
- Techniques introduced in units are observed and monitored every day with each activity
- Safety competencies are assessed in all summative projects included in the course

Mastery: 80%

Sample Assessment Questions:

- The maximum safe operating pressure for acetylene is ____ psi.

Instructional Resources/Tools:

- Textbook: "*Welding Skills, 5th Edition*" by B.J. Moniz, American Technical Publishers, Inc., © 2015
- Workbook: "*Welding Skills Workbook, 5th Edition*" by Jonathon F. Gosse, American Technical Publishers, Inc., © 2015
- Whiteboard: Used as a projector board and drawing board
- Safety equipment (e.g., safety glasses and welding gear)
- Media equipment:
  - Newspaper/welding magazines
  - Videos
  - Slides

Cross Curricular Connections:

- Health: Apply practices that preserve and enhance the safety and health of others
- Physical Education: Differentiate between life threatening and non-life threatening injuries and select the appropriate level of treatment

Depth of Knowledge (Section 5)

DOK: 2

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Curriculum: Welding I and II

Curricular Unit: Joint Design and Welding Terms

Instructional Unit: C. Drawing and welding symbol interpretation

Standard Alignments (Section 2)

SCCLE: SC7.1.Ba-d (Physical Science)
Knowledge: (CA) 3 (H/PE) 6,7 (MA) 1 (SC) 1
CCSS: N.Q.3; G.CO.12; G.GMD.4; G.MG.1; G.MG.3; 11-12.SL.1; 11-12.RST.3; 11-12.RST.4; 11-12.WHST.4
NETS: 1c; 4b
Performance: 3.1, 4.1

Unit (Section 3)

Learning Targets:

- Identify common welding terms
- Describe common types of weld joints
- Describe common types of welds
- List basic weld-design considerations
- Interprets basic elements of a drawing or sketch
- Interprets welding symbol information
- **Fabricates parts from a drawing or sketch**

Instructional Strategies:

- Content is introduced with a teacher-guided lecture-discussion:
  - Classroom discussions: Participate effectively in a range of collaborative discussions
  - Student note taking: Students will summarize and organize information in a note-taking activity
- Student activities (Textbook Ch. 3 – *Joint Design and Welding Terms*):
  - Read Chapter 3: Determine a central idea of a text
  - Class discussion: "Questions for Study and Discussion" on page 47
- Teacher illustrates the welding symbols and puts them into a skilled task

Assessments/Evaluations:

- Formative:
  - Workbook assignment: Ch. 3 – *Joint Design and Welding Terms*, pgs. 9-14
  - Oral quiz…daily practice recognizing welding symbols

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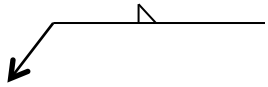
- Summative test – Students will:
  - draw where the appropriate welding symbols go according to the plans
  - interpret a layout identifying appropriate welding symbols and fabricates accordingly
- The knowledge introduced in this unit is observed and monitored weekly with each activity

Sample Assessment Questions:

- Identify the welding symbol shown. 

Instructional Resources/Tools:

- Textbook: "*Welding Skills, 5th Edition*" by B.J. Moniz, American Technical Publishers, Inc., © 2015
- Workbook: "*Welding Skills Workbook, 5th Edition*" by Jonathon F. Gosse, American Technical Publishers, Inc., © 2015
- Whiteboard: Used as a projector board and drawing board
- Welding supplies and machines
- Media equipment:
  - Newspaper/welding magazines
  - Videos
  - Slides

Cross Curricular Connections:

- Science:
  - Determines the appropriate tool
  - Measures accurately
  - Makes quantitative observations
- Math:
  - Number sense
  - Geometric design
- English:
  - Technical reading
  - Writing
  - Discussions – speaking and listening
- Health: Apply practices that preserve and enhance the safety and health of others
- Physical Education: Differentiate between life threatening and non-life threatening injuries and select the appropriate level of treatment

Depth of Knowledge (Section 5)

DOK: 3

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Curriculum: Welding I and II

Curricular Unit: Shielded Metal Arc Welding

Instructional Unit: D. Demonstrate SMAW welding techniques

Standard Alignments (Section 2)

PEGLE: EHMP.2.A
SCGLE: SC7.1.Ba-d (Physical Science)
Knowledge: (CA) 1,3,6 (MA) 1,2 (SC) 1,2
CCSS: N.Q.3; G.CO.12; G.GMD.4; G.MG.1; G.MG .3; 11-12.SL.1; 11-12.RST.3; 11-12.RST.4; 11-12.WHST.4
NETS: 1c; 4b
Performance: 1.5, 3.1, 3.2

Unit (Section 3)

Learning Targets:

- Performs safety inspections of SMAW equipment and accessories
- Makes minor external repairs to SMAW equipment and accessories
- Sets up for SMAW operations on carbon steel
- Operates SMAW equipment on carbon steel
- Makes fillet welds in all positions on carbon steel
- Makes groove welds in all positions on carbon steel
- **Passes SMAW welder performance qualification test (2G and 3G, uphill, limited thickness test plates) on carbon steel**

Instructional Strategies:

- Content is introduced by the teacher through guided lecture/discussion prior to the demonstration of the proper welding techniques (joint designs, welding rods, positions)
  - Classroom discussions: Participate effectively in a range of collaborative discussions
  - Student note taking: Students summarize and organize information in a note-taking activity
- Student activities (Textbook Ch. 8-15 – *SMAW [Shielded Metal Arc Welding]*):
  - Read Chapters 8-15: Determine a central idea of a text
  - Class discussion: "Questions for Study and Discussion" from each chapter
- Complete relevant live work when applicable

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Assessments/Evaluations:

- Formative:
  - Workbook assignment: Ch. 8-15 –SMAW, pgs. 93-170
  - Oral quiz…daily practice recognizing welding symbols
  - Students practice SMAW techniques of a certified weld
- Summative test – Students will:
  - draw where the appropriate welding symbols go according to the plans
  - interpret a layout identifying appropriate welding symbols and fabricates accordingly using SMAW techniques
- Summative/formative assessment of relevant live work when available

Sample Assessment Questions:

- A narrow weld bead with pointed ripples results if the travel speed is too slow. (False)

Instructional Resources/Tools:

- Textbook: "*Welding Skills, 5th Edition*" by B.J. Moniz, American Technical Publishers, Inc., © 2015
- Workbook: "*Welding Skills Workbook, 5th Edition*" by Jonathon F. Gosse, American Technical Publishers, Inc., © 2015
- Whiteboard: Used as a projector board and drawing board
- Welding supplies and machines
- Media equipment:
  - Newspaper/welding magazines
  - Videos
  - Slides

Cross Curricular Connections:

- Math:
  - Number sense
  - Geometric design
- English:
  - Technical reading
  - Writing
  - Discussion – speaking and listening
- Health: Apply safety skills during physical activities
- Science:
  - Determines the appropriate tool
  - Measures accurately
  - Makes quantitative observations

Depth of Knowledge (Section 5)

DOK: 3

Board Approved 8-3-15

Curriculum: Welding I and II

Curricular Unit: Gas Metal Arc Welding (MIG)

Instructional Unit: E. Demonstrate GMAW welding techniques

Standard Alignments (Section 2)

PEGLE: EHMP.2.A
SCGLE: SC7.1.Ba-d (Physical Science)
Knowledge: (CA) 3 (MA) 1,2 (SC) 1,2
CCSS: N.Q.3; G.CO.12; G.GMD.4; G.MG.1; G.MG.3; 11-12.SL.1; 11-12.RST.3; 11-12.RST.4; 11-12.WHST.4
NETS: 1c; 4b
Performance: 1.5, 3.1, 3.2

Unit (Section 3)

Learning Targets:

- Performs safety inspections of GMAW equipment and accessories
- Makes minor external repairs to GMAW equipment and accessories

Short Circuiting Transfer

- Sets up for GMAW-S operations on carbon steel
- Operates GMAW-S equipment on carbon steel
- Makes fillet welds in all positions on carbon steel
- Makes groove welds in all positions on carbon steel
- **Passes GMAW-S welder performance qualification test on carbon steel**

Spray Transfer

- Sets up for GMAW (spray) operations on carbon steel
- Operates GMAW (spray) equipment on carbon steel
- Makes fillet welds in the 1F and 2F positions on carbon steel
- Makes groove welds in the 1G position on carbon steel
- Passes GMAW (spray) welder performance qualification test on carbon steel

Instructional Strategies:

- Content is introduced by the teacher through guided lecture-discussion prior to the demonstration of the proper welding techniques (joint designs, welding wire and size, positions):
  - Classroom discussions: Participate effectively in a range of collaborative discussions
  - Student note taking: Students summarize and organize information in a note-taking activity
- Student activities (Textbook Ch. 19-21 – *GMAW [Gas Metal Arc Welding]*):
  - Read Chapters 19-21: Determine a central idea of a text
  - Class discussion: "Questions for Study and Discussion" from each chapter
- Complete relevant live work when applicable

Assessments/Evaluations:

- Formative:
  - Workbook assignment: Ch. 19-21 – GMAW, pgs. 65-74
  - Oral quiz…daily practice recognizing welding symbols
  - Students practice GMAW techniques of a certified weld
- Summative test – Students will:
  - draw where the appropriate welding symbols go according to the plans
  - interpret a layout identifying appropriate welding symbols and fabricates, accordingly, using GMAW techniques
- Summative/formative assessment of relevant live work when available

Sample Assessment Questions:

- Voltage is increased by increasing wire feed speed. (False)

Instructional Resources/Tools:

- Textbook: "*Welding Skills, 5th Edition*" by B.J. Moniz, American Technical Publishers, Inc., © 2015
- Workbook: "*Welding Skills Workbook, 5th Edition*" by Jonathon F. Gosse, American Technical Publishers, Inc., © 2015
- Whiteboard: Used as a projector board and drawing board
- Welding supplies and machines
- Media equipment:
  - Newspaper/welding magazines
  - Videos
  - Slides

Cross Curricular Connections:

- Math:
  - Number sense
  - Geometric design
- English:
  - Technical reading
  - Writing
  - Discussion – speaking and listening

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- Health: Apply safety skills during physical activities
- Science:
  - Determines the appropriate tool
  - Measures accurately
  - Makes quantitative observations

Depth of Knowledge (Section 5)

DOK: 3

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Curriculum: Welding I and II

Curricular Unit: Flux Cored Arc Welding

Instructional Unit: F. Demonstrate FCAW welding techniques

Standard Alignments (Section 2)

PECLE: EHMP.2.A
SCGLE: SC7.1.Ba-d (Physical Science)
Knowledge: (CA) 3 (MA) 1,2 (SC) 1,2
CCSS: N.Q.3; G.CO.12; G.GMD.4; G.MG.1; G.MG.3; 11-12.SL.1; 11-12.RST.3; 11-12.RST.4; 11-12.WHST.4
NETS: 1c; 4b
Performance: 1.5, 3.1, 3.2

Unit (Section 3)

Learning Targets:

- Performs safety inspections of FCAW equipment and accessories
- Makes minor external repairs to FCAW equipment and accessories

<u>Gas Shielded</u>

- Sets up for FCAW- G/GM operations on carbon steel
- Operates FCAW- G/GM equipment on carbon
- **Makes fillet welds in all positions on carbon steel**
- Makes groove welds in all positions on carbon steel
- Passes FCAW-G/GM welder performance qualification test on carbon steel

<u>Self-Shielded</u>

- Sets up for FCAW- S operations on carbon steel
- Operates FCAW- S equipment on carbon
- Makes fillet welds in all positions on carbon steel
- Makes groove welds in all positions on carbon steel
- Passes FCAW- S welder performance qualification test on carbon steel

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Instructional Strategies:

- Content is introduced by the teacher through guided lecture/discussion prior to the demonstration of the proper welding techniques (joint designs, welding wire and size, positions):
  - Classroom discussions: Participate effectively in a range of collaborative discussions
  - Student note taking: Students summarize and organize information in a note-taking activity
- Student activities (Textbook Ch. 22 – *FCAW [Flux Core Arc Welding]*):
  - Read Chapter 22: Determine a central idea of a text
  - Class discussion: "Questions for Study and Discussion" from pg. 276
- Complete relevant live work when applicable

Assessments/Evaluations:

- Formative:
  - Workbook assignment: Ch. 22 –FCAW, pgs. 75-78
  - Oral quiz…daily practice recognizing welding symbols
  - Students practice FCAW techniques of a certified weld
- Summative test – Students will:
  - draw where the appropriate welding symbols go according to the plans
  - interpret a layout identifying appropriate welding symbols and fabricates accordingly using FCAW techniques
- Summative/formative assessment of relevant live work when available

Sample Assessment Questions:

- Flux cored electrodes are tubular electrodes. (T/F)

Instructional Resources/Tools:

- Textbook: "*Welding Skills, 5th Edition*" by B.J. Moniz, American Technical Publishers, Inc., © 2015
- Workbook: "*Welding Skills Workbook, 5th Edition*" by Jonathon F. Gosse, American Technical Publishers, Inc., © 2015
- Whiteboard: Used as a projector board and drawing board
- Welding supplies and machines
- Media equipment:
  - Newspaper/welding magazines
  - Videos
  - Slides

Cross Curricular Connections:

- Math:
  - Number sense
  - Geometric design
- English:
  - Technical reading
  - Writing
  - Discussion – speaking and listening

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- Health: Apply safety skills during physical activities
- Science:
  - Determines the appropriate tool
  - Measure accurately
  - Makes quantitative observations

Depth of Knowledge (Section 5)

DOK: 3

Curriculum: Welding II

Curricular Unit: Gas Tungsten Arc Welding (GTAW-TIG)

Instructional Unit: G. Demonstrate TIG welding techniques

Standard Alignments (Section 2)

PECLE: EHMP.2.A
SCGLE: SC7.1.Ba-d (Physical Science)
Knowledge: (CA) 3 (MA) 1,2 (SC) 1,2
CCSS: N.Q.3; G.CO.12; G.GMD.4; G.MG.1; G.MG.3; 11-12.SL.1; 11-12.RST.3; 11-12.RST.4; 11-12.WHST.4
NETS: 1c; 4b
Performance: 1.5, 3.1, 3.2

Unit (Section 3)

Learning Targets:

- Performs safety inspections of GTAW equipment and accessories
- Makes minor external repairs to GTAW equipment and accessories

Carbon Steel

- Sets up for GTAW operations on carbon
- Operates GTAW equipment on carbon steel
- Makes fillet welds in all positions on carbon steel
- Makes groove welds in all positions on carbon steel
- **Passes GTAW welder performance qualification test on carbon steel**

Austenitic Stainless Steel

- Sets up for GTAW operations on austenitic stainless steel
- Operates GTAW equipment on austenitic stainless steel
- Makes fillet welds in the 1F, 2F and 3F positions on austenitic stainless steel
- Makes groove welds, in the 1G and 2G positions on austenitic stainless steel
- Passes GTAW welder performance qualification test on austenitic stainless steel

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Aluminum

- Sets up for GTAW operations on aluminum
- Operates GTAW equipment on aluminum
- Makes fillet welds in the 1F and 2F positions on aluminum
- Makes groove welds in the 1G position on aluminum
- Passes GTAW welder performance qualification test on aluminum

Instructional Strategies:

- Content is introduced by the teacher through guided lecture-discussion prior to the demonstration of the proper welding techniques (joint designs, welding filler metal and tungsten sizes, positions):
  - Classroom discussions: Participate effectively in a range of collaborative discussions
  - Student note taking: Students summarize and organize information in a note-taking activity
- Student activities (Textbook Ch. 16-18 – *GTAW [Gas Tungsten Arc Welding]*):
  - Read Chapters 16-18: Determine a central idea of a text
  - Class discussion: "Questions for Study and Discussion" from each chapter
- Complete relevant live work when applicable

Assessments/Evaluations:

- Formative:
  - Workbook assignment: Ch. 16-18 –GTAW, pgs. 55-64
  - Oral quiz…daily practice recognizing welding symbols
  - Students practice GTAW techniques of a certified weld
- Summative test – Students will:
  - draw where the appropriate welding symbols go according to the plans
  - interpret a layout identifying appropriate welding symbols and fabricates accordingly using GTAW techniques
- Summative/formative assessment of relevant live work when available

Sample Assessment Questions:

- DCEP is rarely used in GTAW. (T/F)

Instructional Resources/Tools:

- Textbook: "*Welding Skills, 5th Edition*" by B.J. Moniz, American Technical Publishers, Inc., © 2015
- Workbook: "*Welding Skills Workbook, 5th Edition*" by Jonathon F. Gosse, American Technical Publishers, Inc., © 2015
- Whiteboard: Used as a projector board and drawing board
- Welding supplies and machines
- Media equipment:
  - Newspaper/welding magazines
  - Videos
  - Slides

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Cross Curricular Connections:

- Math:
  - Number sense
  - Geometric design
- English:
  - Technical reading
  - Writing
  - Discussion – speaking and listening
- Health: Apply safety skills during physical activities
- Science:
  - Determines the appropriate tool
  - Measures accurately
  - Makes quantitative observations

Depth of Knowledge (Section 5)

DOK: 3

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Curriculum: Welding I and II

Curricular Unit: Thermal Cutting Processes

Instructional Unit: H. Demonstrate Various Cutting Processes (OFC, PAC, CAC)

Standard Alignments (Section 2)

PEGLE: EHMP.2.A
SCCLE: SC7.1.Ba-d (Physical Science)
Knowledge: (CA) 3 (MA) 1,2 (SC) 1,2
CCSS: N.Q.3; G.CO.12; G.GMD.4; G.MG.1; G.MG.3; 11-12.SL.1; 11-12.RST.3; 11-12.RST.4; 11-12.WHST.4
NETS: 1c; 4b
Performance: 1.5, 3.1, 3.2

Unit (Section 3)

Learning Targets:

Unit 1: Manual Oxyfuel Gas Cutting (OFC)

- Performs safety inspections of manual OFC equipment and accessories
- Makes minor external repairs to manual OFC equipment and accessories
- Sets up for manual OFC operations on carbon steel
- Operates manual OFC equipment on carbon steel
- Performs straight, square edge cutting operations in the flat position on carbon steel
- Performs shape, square edge cutting operations in the flat position on carbon steel
- **Performs straight, bevel edge cutting operations in the flat and position on carbon steel**
- Performs scarfing and gouging operations to remove base and weld metal, in flat and horizontal positions on carbon steel

Unit 2: Mechanized Oxyfuel Gas Cutting (OFC) [e.g., Track Burner]

- Performs safety inspections of mechanized OFC equipment and accessories
- Makes minor external repairs to mechanized OFC equipment and accessories
- Sets up for mechanized OFC operations on carbon steel
- Operates mechanized OFC equipment on carbon steel
- Performs straight, square edge cutting operations in the flat position on carbon steel

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- Performs straight, bevel edge cutting operations in the flat position on of carbon steel

Unit 3: Manual Plasma Arc Cutting (PAC)

- Performs safety inspections of manual PAC equipment and accessories
- Makes minor external repairs to manual PAC equipment and accessories
- Sets up for manual PAC operations on carbon steel, austenitic stainless steel, and aluminum
- Operates manual PAC equipment on carbon steel, austenitic stainless steel, and aluminum
- **Performs straight, square edge cutting operations, in the flat position on carbon steel, austenitic stainless steel, and aluminum**
- Performs shape, square edge cutting operations in the flat position on carbon steel, austenitic stainless steel, and aluminum

Unit 4: Manual Air Carbon Arc Cutting (CAC-A)

- Performs safety inspections of manual CAC-A equipment and accessories
- Makes minor external repairs to manual CAC-A equipment and accessories
- Sets up for manual CAC-A scarfing and gouging operations on carbon steel
- Operates manual CAC-A equipment on carbon steel
- Performs scarfing and gouging operations to remove base and weld metal, in the flat and horizontal positions on carbon steel

Instructional Strategies:

- Content is introduced by the teacher through guided lecture-discussion prior to the demonstration of the proper cutting techniques (tip sizes, amperage settings, carbon arc rod sizes):
  - Classroom discussions: Participate effectively in a range of collaborative discussions
  - Student note taking: Students summarize and organize information in a note-taking activity
- Student activities (Textbook Ch. 25 – *OFC, PAC, CAC)*:
  - Read Chapter 25: Determine a central idea of a text
  - Class discussion: "Questions for Study and Discussion" from each chapter
- Complete relevant live work when applicable

Assessments/Evaluations:

- Formative:
  - Workbook assignment: Ch. 25 – OFC, PAC, CAC, pgs. 91-94
  - Oral quiz…daily practice recognizing welding symbols
  - Students practice various cutting techniques of different shapes and angles

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- Summative test – Students will:
  - draw where the appropriate welding symbols go according to the plans
  - interpret a layout identifying appropriate welding symbols and fabricates accordingly using appropriate cutting techniques
- Summative/formative assessment of relevant live work when available

Sample Assessment Questions:

- The maximum safe working pressure of acetylene is 15 psi. (T/F)

Instructional Resources/Tools:

- Textbook: "*Welding Skills, 5th Edition*" by B.J. Moniz, American Technical Publishers, Inc., © 2015
- Workbook: "*Welding Skills Workbook, 5th Edition*" by Jonathon F. Gosse, American Technical Publishers, Inc., © 2015
- Whiteboard: Used as a projector board and drawing board
- Welding supplies and machines
- Media equipment:
  - Newspaper/welding magazines
  - Videos
  - Slides

Cross Curricular Connections:

- Math:
  - Number sense
  - Geometric design
- English:
  - Technical reading
  - Writing
  - Discussion – speaking and listening
- Health: Apply safety skills during physical activities
- Science:
  - Determines the appropriate tool
  - Measures accurately
  - Makes quantitative observations

Depth of Knowledge (Section 5)

DOK: 3

Curriculum: Welding I and II

Curricular Unit: Welding Inspection and Testing

Instructional Unit: I. Prep Metal, Weld for Certification, and Destructive and Nondestructive Testing

Standard Alignments (Section 2)

PEGLE: EHMP.2.A
SCCLE: SC7.1.Ba-d (Physical Science)
Knowledge: (CA) 3 (MA) 1,2 (SC) 1,2
CCSS: N.Q.3, G.CO.12; G.GMD.4; G.MG.1; G.MG .3; 11-12.SL.1; 11-12.RST.3; 11-12.RST.4; 11-12.WHST.4
NETS: 1c; 4b
Performance: 1.5, 3.1, 3.2

Unit (Section 3)

Learning Targets:

- Examines cut surfaces and edges of prepared base metal parts
- **Examines tacks, root passes, intermediate layers, and completed welds**

Instructional Strategies:

- Content is introduced by the teacher through guided lecture/discussion prior to the demonstration of good and bad sample welds:
  - Classroom discussions: Participate effectively in a range of collaborative discussions
  - Student note taking: Students summarize and organize information in a note taking activity
- Student activities (Textbook Chapters 31, 32, 34 – *Destructive Testing, Nondestructive Examination, Weld Discontinuities and Failures)*
  - Read Chapters 31, 32, 34: Determine a central idea of a text
  - Class discussion: "Questions for Study and Discussion" from each chapter
- Complete relevant live work when applicable

Assessments/Evaluations:

- Formative:
  - Workbook assignment: Chapters 31, 32, 34 – pgs. 117-124, 129-132
  - Oral quiz…daily practice recognizing welding symbols
  - Students recognize inconsistent and deficient welds
- Summative test – Students will:
  - draw where the appropriate welding symbols go according to the plans
  - communicate what factors contribute to inconsistent and deficient welds
- Summative/formative assessment of relevant live work when available

Sample Assessment Questions:

- The ultrasonic test is a non-destructive testing procedure. (T/F)

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Instructional Resources/Tools:

- Textbook: "*Welding Skills, 5th Edition*" by B.J. Moniz, American Technical Publishers, Inc., © 2015
- Workbook: "*Welding Skills Workbook, 5th Edition*" by Jonathon F. Gosse, American Technical Publishers, Inc., © 2015
- Whiteboard: Used as a projector board and drawing board
- Welding supplies and machines
- Media equipment:
  - Newspaper/welding magazines
  - Videos
  - Slides

Cross Curricular Connections:

- Math:
  - Number sense
  - Geometric design
- English:
  - Technical reading
  - Writing
  - Discussion – speaking and listening
- Health: Apply safety skills during physical activities
- Science:
  - Determines the appropriate tool
  - Measures accurately
  - Makes quantitative observations

Depth of Knowledge (Section 5)

DOK: 3

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Curriculum: Welding I and II

Curricular Unit: Embedded Math – Math in Welding

Instructional Unit: J. Apply math skills required in the welding industry

Standard Alignments (Section 2)

GLE/CLE: N/A
Knowledge: (MA) 1,2,4,5
CCSS: N-RN.1; N-Q.1; N-Q.3; A-CED.1; A-REI.11; A-REI.12; F-BF.1; G-CO.12; G-MGD.1; G-MGD.3; G-MG.1; G-MG.3
NETS: 1a; 4b
Performance: 1.10, 3.3

Unit (Section 3)

Learning Targets:

- Apply and extend previous understandings of adding/subtracting/multiplying/dividing of whole numbers to solve practical problems
- Apply and extend previous understandings of adding/subtracting/multiplying/dividing of fractions to solve practical problems
- Apply and extend previous understandings of adding/subtracting/multiplying/dividing of decimals to solve practical problems
- Apply and extend previous understandings of ratios, proportions, and percents to solve practical problems
- **Use a variety of tools and methods to solve and design problems. (e.g., standard/metric ruler, architect/engineer scale, t-square, etc.)**
- Convert and apply measurements to solve real-life and mathematical problems
- Recognize the basic shapes (2D and 3D) used in industry and apply basic geometry to measure them
- Use and apply formulas to solve real-life and mathematical problems (e.g., Pythagorean Theorem, Volume, Area, etc.)
- Solve power and root equations as they apply to real-life and mathematical problems
- COMPASS Test-Prep: Practice Algebra COMPASS test-prep targets ranging from Pre-Algebra through College Algebra

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Instructional Strategies:

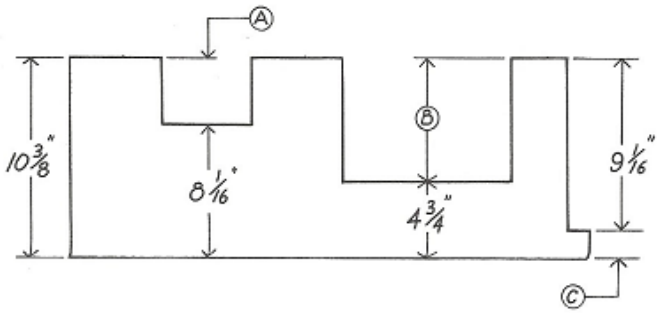
- The teacher will:
  - use classroom instruction and/or demonstrations to introduce or revisit targets required to practice the competency at hand
  - model appropriate work required to complete the task
  - direct students to appropriate resources when needed
  - provide:
    - examples of good vs. poor work
    - feedback during and at the conclusion of the assignment
    - small learning group opportunities when applicable

Assessments/Evaluations:

- Formative:
  - Projects/activities
  - Constructions
  - Worksheets
  - Quizzes
  - Games
- Summative: The only summative given is the Term Exam which is comprehensive of both the relevant math and the COMPASS test-prep targets practiced

Sample Assessment Questions:

- Find lengths "A", "B", and "C".



Instructional Resources/Tools:

- Workbook: *Math for Welders*, Marion, 1996
- Internet Sources (examples):
  - Ruler game: http://www.rulergame.net/
  - Edgnuity (COMPASS test prep): https://learn.education2020.com/student/
- Supplies and tools, such as:
  - rulers
  - scales
  - T-squares
  - drafting boards
  - triangles
  - compass
  - protractor
- Technology tools, such as:

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- SMART Board
- iPads
- laptops
- scanners
- student desktops
- printers

Cross Curricular Connections:

- Welding:
  - Measurement
  - Layout mathematics

Depth of Knowledge (Section 5)

DOK: 3