

**Maine Department of Education
Career and Technical Education**

Welding; CIP: 48.0508
National Construction Career Education Research (NCCER)-Core
Intersections with
Maine College and Career Readiness-Mathematics Standards

<p style="text-align: center;">Welder: Duties, Skills, and Tasks</p>	<p style="text-align: center;">Mathematics Content Standards and The Eight Mathematical Practices (CCSS)</p>	<p style="text-align: center;">Demonstration of Proficiency (Possible Evidence, Project, Performance Assessment, Certification etc.)</p>	<p style="text-align: center;">Maine Learning Results- Guiding Principles, and Career and Education Development</p>
<p>Basic Safety</p>			
<ol style="list-style-type: none"> 1. Explain the idea of a safety culture and its importance in the construction crafts. 2. Identify causes of accidents and the impact of accident costs. 3. Explain the role of OSHA in job-site safety. 4. Explain OSHA's General Duty Clause and 1926 CFR Subpart C. 5. Recognize hazard recognition and risk assessment techniques. 6. Explain fall protection, ladder, stair, and scaffold procedures and requirements. 7. Identify struck-by hazards and demonstrate safe working procedures and requirements. 8. Identify caught-in-between hazards and demonstrate safe working procedures and requirements. 9. Define safe work procedures to 	<p>Math.S-ID.A.4 (1 – 7) Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.</p>	<p>OSHA-10hr Assessment Career Safe Assessment</p>	<p style="text-align: center;">Guiding Principles</p> <p>A. A clear and effective communicator who:</p> <ol style="list-style-type: none"> 2. Uses evidence and logic appropriately in communication 3. Adjusts communication based on the audience 4. Uses a variety of modes of expression (spoken, written and visual and performing including the use of technology to create and share the expressions) <p>B. A self-directed and lifelong learner who:</p> <ol style="list-style-type: none"> 1. Recognizes the need for information and locates and evaluates resources 2. Applies knowledge to set goals and make informed decisions 3. Applies knowledge in new contexts 4. Demonstrates initiative and independence 5. Demonstrates flexibility including the

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<p>use around electrical hazards. 10. Demonstrate the use and care of appropriate personal protective equipment (PPE). 11. Explain the importance of hazard communications (Haz-Com) and Material Safety Data Sheets (MSDSs). 12. Identify other construction hazards on your job site, including hazardous material exposures, environmental elements, welding and cutting hazards, confined spaces, and fires.</p>			<p>ability to learn, unlearn and relearn 6. Demonstrates reliability and concern for quality 7. Uses interpersonal skills to learn and work with individuals from diverse backgrounds C. A creative and practical problem solver who: 1. Observes and evaluates situations to define problems 3. Identifies patterns, trends and relationships that apply to solutions 4. Generates a variety of solutions, builds a case for a best response and critically evaluates the effectiveness of the response 5. Sees opportunities, finds resources and seeks results 6. Uses information and technology to solve problems 7. Perseveres in challenging situations D. A responsible and involved citizen who: 2. Accepts responsibility for personal decisions and actions 3. Demonstrates ethical behavior and the moral courage to sustain it 6. Demonstrates awareness of personal and community health and wellness E. An integrative and informed thinker who:</p>

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			1. Gains and applies knowledge across disciplines and learning contexts and to real-life situations with and without technology 2. Evaluates and synthesizes information from multiple sources 3. Applies ideas across disciplines 4. Applies systems thinking to understand the interaction and influence of related parts on each other and on outcomes
Introduction to Construction Math			
1. Add, subtract, multiply, and divide whole numbers, with and without a calculator. 2. Use a standard ruler, a metric ruler, and a measuring tape to measure. 3. Add, subtract, multiply, and divide fractions. 4. Add, subtract, multiply, and divide decimals, with and without a calculator. 5. Convert decimals to percentages and percentages to decimals. 6. Convert fractions to decimals and decimals to fractions. 7. Explain what the metric system is and how it is important in the	Math.G-CO.A.1 (9) Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. Math.G-SRT.C.8 (9)C Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	Worksheet on basic geometric shapes.	Guiding Principles C. A creative and practical problem solver who: 1. Observes and evaluates situations to define problems 3. Identifies patterns, trends and relationships that apply to solutions 6. Uses information and technology to solve problems 7. Perseveres in challenging situations decisions and actions E. An integrative and informed thinker who: 1. Gains and applies knowledge across disciplines and learning contexts and to real-life situations with and without technology 2. Evaluates and synthesizes information

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<p>construction trade. 8. Recognize and use metric units of length, weight, volume, and temperature. 9. Recognize some of the basic shapes used in the construction industry and apply basic geometry to measure them.</p>			<p>from multiple sources 3. Applies ideas across disciplines</p>
<p>Introduction to Hand Tools</p>			
<p>1. Recognize and identify some of the basic hand tools and their proper uses in the construction trade. 2. Visually inspect hand tools to determine if they are safe to use. 3. Safely use hand tools.</p>	<p>NA</p>		<p align="center">Guiding Principles</p> <p>B. A self-directed and lifelong learner who:</p> <p>1. Recognizes the need for information and locates and evaluates resources 2. Applies knowledge to set goals and make informed decisions 3. Applies knowledge in new contexts 4. Demonstrates initiative and independence 5. Demonstrates flexibility including the ability to learn, unlearn and relearn 6. Demonstrates reliability and concern for quality</p> <p>C. A creative and practical problem solver who:</p> <p>1. Observes and evaluates situations to define problems 5. Sees opportunities, finds resources and seeks results 6. Uses information and technology to</p>

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			<p>solve problems</p> <p>7. Perseveres in challenging situations</p> <p>D. A responsible and involved citizen who:</p> <p>2. Accepts responsibility for personal decisions and actions</p> <p>3. Demonstrates ethical behavior and the moral courage to sustain it</p> <p>5. Displays global awareness and economic and civic literacy</p> <p>6. Demonstrates awareness of personal and community health and wellness</p> <p>E. An integrative and informed thinker who:</p> <p>1. Gains and applies knowledge across disciplines and learning contexts and to real-life situations with and without technology</p> <p>2. Evaluates and synthesizes information from multiple sources</p> <p>3. Applies ideas across disciplines</p>
<p>Introduction to Power Tools</p>			
<p>1. Identify power tools commonly used in the construction trades.</p> <p>2. Use power tools safely.</p> <p>3. Explain how to maintain power tools properly.</p>	<p align="center">NA</p>		<p align="center">Guiding Principles</p> <p>B. A self-directed and lifelong learner who:</p> <p>1. Recognizes the need for information and locates and evaluates resources</p> <p>2. Applies knowledge to set goals and make informed decisions</p>

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			<p>3. Applies knowledge in new contexts 4. Demonstrates initiative and independence 5. Demonstrates flexibility including the ability to learn, unlearn and relearn 6. Demonstrates reliability and concern for quality</p> <p>C. A creative and practical problem solver who: 1. Observes and evaluates situations to define problems 5. Sees opportunities, finds resources and seeks results 6. Uses information and technology to solve problems 7. Perseveres in challenging situations</p> <p>D. A responsible and involved citizen who: 2. Accepts responsibility for personal decisions and actions 3. Demonstrates ethical behavior and the moral courage to sustain it 5. Displays global awareness and economic and civic literacy 6. Demonstrates awareness of personal and community health and wellness</p> <p>E. An integrative and informed thinker who: 1. Gains and applies knowledge across disciplines and learning contexts and to real-life situations with and without</p>

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			technology 2. Evaluates and synthesizes information from multiple sources 3. Applies ideas across disciplines
<p>Introduction to Construction Drawings</p>			
<ol style="list-style-type: none"> 1. Recognize and identify basic construction drawing terms, components, and symbols. 2. Relate information on construction drawings to actual locations on the print/material. 3. Recognize different classifications of construction drawings. 4. Interpret and use drawing dimensions. 	<p>Math.G-CO.A.1 (1) Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.</p> <p>Math.G-CO.A.2 (2) Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare</p>	<p>Worksheets on angles, circles, perpendicular lines, parallel lines, distance along the line, and circumference and their rotations.</p> <p>Assess accuracy on finished product.</p>	<p align="center">Guiding Principles</p> <p>B. A self-directed and lifelong learner who:</p> <ol style="list-style-type: none"> 1. Recognizes the need for information and locates and evaluates resources 2. Applies knowledge to set goals and make informed decisions 3. Applies knowledge in new contexts 4. Demonstrates initiative and independence 5. Demonstrates flexibility including the ability to learn, unlearn and relearn 6. Demonstrates reliability and concern for quality 7. Uses interpersonal skills to learn and work with individuals from diverse backgrounds <p>C. A creative and practical problem solver who:</p> <ol style="list-style-type: none"> 1. Observes and evaluates situations to define problems 6. Uses information and technology to solve problems 7. Perseveres in challenging situations <p>D. A responsible and involved citizen</p>

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	<p>transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).</p> <p>Math.G-CO.A.5 (4) Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.</p>		<p>who: 2. Accepts responsibility for personal decisions and actions 6. Demonstrates awareness of personal and community health and wellness</p> <p>E. An integrative and informed thinker who: 1. Gains and applies knowledge across disciplines and learning contexts and to real-life situations with and without technology 2. Evaluates and synthesizes information from multiple sources</p>
Basic Rigging			
<ol style="list-style-type: none"> 1. Identify and describe the use of slings and common rigging hardware. 2. Describe basic inspection techniques and rejection criteria used for slings and hardware. 3. Describe basic hitch configurations and their proper connections. 	NA		<p style="text-align: center;">Guiding Principles</p> <p>A. A clear and effective communicator who: 2. Uses evidence and logic appropriately in communication 3. Adjusts communication based on the audience 4. Uses a variety of modes of expression (spoken, written and visual and</p>

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<p>4. Describe basic load-handling safety practices. 5. Demonstrate proper use of American National Standards Institute (ANSI) hand signals.</p>			<p>performing including the use of technology to create and share the expressions) B. A self-directed and lifelong learner who: 1. Recognizes the need for information and locates and evaluates resources 2. Applies knowledge to set goals and make informed decisions 3. Applies knowledge in new contexts 4. Demonstrates initiative and independence 5. Demonstrates flexibility including the ability to learn, unlearn and relearn 6. Demonstrates reliability and concern for quality 7. Uses interpersonal skills to learn and work with individuals from diverse backgrounds C. A creative and practical problem solver who: 1. Observes and evaluates situations to define problems 3. Identifies patterns, trends and relationships that apply to solutions 4. Generates a variety of solutions, builds a case for a best response and critically evaluates the effectiveness of the response 5. Sees opportunities, finds resources and seeks results</p>

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			<p>6. Uses information and technology to solve problems</p> <p>D. A responsible and involved citizen who:</p> <p>2. Accepts responsibility for personal decisions and actions</p> <p>3. Demonstrates ethical behavior and the moral courage to sustain it</p> <p>6. Demonstrates awareness of personal and community health and wellness</p> <p>E. An integrative and informed thinker who:</p> <p>1. Gains and applies knowledge across disciplines and learning contexts and to real-life situations with and without technology</p> <p>2. Evaluates and synthesizes information from multiple sources</p> <p>3. Applies ideas across disciplines</p> <p>4. Applies systems thinking to understand the interaction and influence of related parts on each other and on outcomes</p>
Basic Communication Skills			
<p>1. Interpret information and instructions presented in both verbal and written form.</p> <p>2. Communicate effectively in on-the-job situations using verbal and written skills.</p> <p>3. Communicate effectively on the</p>	<p>NA</p>		<p>Guiding Principles</p> <p>A. A clear and effective communicator who:</p> <p>2. Uses evidence and logic appropriately in communication</p> <p>3. Adjusts communication based on the audience</p>

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<p>job using electronic communication devices.</p>			<p>4. Uses a variety of modes of expression (spoken, written and visual and performing including the use of technology to create and share the expressions)</p> <p>B. A self-directed and lifelong learner who:</p> <ol style="list-style-type: none"> 1. Recognizes the need for information and locates and evaluates resources 3. Applies knowledge in new contexts 6. Demonstrates reliability and concern for quality 7. Uses interpersonal skills to learn and work with individuals from diverse backgrounds <p>C. A creative and practical problem solver who:</p> <ol style="list-style-type: none"> 1. Observes and evaluates situations to define problems 3. Identifies patterns, trends and relationships that apply to solutions 6. Uses information and technology to solve problems 7. Perseveres in challenging situations <p>D. A responsible and involved citizen who:</p> <ol style="list-style-type: none"> 2. Accepts responsibility for personal decisions and actions 3. Demonstrates ethical behavior and the moral courage to sustain it 4. Understands and respects diversity

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<p>Basic Employability Skills</p>			
<ol style="list-style-type: none"> 1. Explain the role of an employee in the construction industry. 2. Demonstrate critical thinking skills and the ability to solve problems using those skills. 3. Demonstrate knowledge of computer systems and explain common uses for computers in the construction industry. 4. Define effective relationship skills. 5. Recognize workplace issues such as sexual harassment, stress, and substance abuse. 	<p>Mathematical Practices 1-8 (2)</p> <ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. 	<p>Observation of students working on projects throughout the year.</p>	<p align="center">Guiding Principles</p> <p>A. A clear and effective communicator who:</p> <ol style="list-style-type: none"> 2. Uses evidence and logic appropriately in communication 3. Adjusts communication based on the audience 4. Uses a variety of modes of expression (spoken, written and visual and performing including the use of technology to create and share the expressions) <p>B. A self-directed and lifelong learner who:</p> <ol style="list-style-type: none"> 1. Recognizes the need for information and locates and evaluates resources 2. Applies knowledge to set goals and make informed decisions 3. Applies knowledge in new contexts 4. Demonstrates initiative and independence 5. Demonstrates flexibility including the ability to learn, unlearn and relearn 6. Demonstrates reliability and concern for quality 7. Uses interpersonal skills to learn and work with individuals from diverse backgrounds <p>C. A creative and practical problem</p>

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			<p>solver who:</p> <ol style="list-style-type: none"> 1. Observes and evaluates situations to define problems 3. Identifies patterns, trends and relationships that apply to solutions 4. Generates a variety of solutions, builds a case for a best response and critically evaluates the effectiveness of the response 5. Sees opportunities, finds resources and seeks results 6. Uses information and technology to solve problems 7. Perseveres in challenging situations <p>D. A responsible and involved citizen who:</p> <ol style="list-style-type: none"> 1. Participates positively in the community and designs creative solutions to meet human needs and wants 2. Accepts responsibility for personal decisions and actions 3. Demonstrates ethical behavior and the moral courage to sustain it 4. Understands and respects diversity 6. Demonstrates awareness of personal and community health and wellness <p>E. An integrative and informed thinker who:</p> <ol style="list-style-type: none"> 2. Evaluates and synthesizes information from multiple sources

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			<p>3. Applies ideas across disciplines 4. Applies systems thinking to understand the interaction and influence of related parts on each other and on outcomes</p>
<p>Introduction to Materials Handling</p>			
<p>1. Define a load. 2. Establish a pre-task plan prior to moving a load. 3. Use proper materials-handling techniques. 4. Choose appropriate materials-handling equipment for the task. 5. Recognize hazards and follow safety procedures required for materials handling.</p>	<p align="center">NA</p>		<p align="center">Guiding Principles</p> <p>A. A clear and effective communicator who: 2. Uses evidence and logic appropriately in communication 3. Adjusts communication based on the audience 4. Uses a variety of modes of expression (spoken, written and visual and performing including the use of technology to create and share the expressions)</p> <p>B. A self-directed and lifelong learner who: 1. Recognizes the need for information and locates and evaluates resources 2. Applies knowledge to set goals and make informed decisions 4. Demonstrates initiative and independence 5. Demonstrates flexibility including the ability to learn, unlearn and relearn 6. Demonstrates reliability and concern for quality</p>

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			<p>7. Uses interpersonal skills to learn and work with individuals from diverse backgrounds</p> <p>C. A creative and practical problem solver who:</p> <p>1. Observes and evaluates situations to define problems</p> <p>5. Sees opportunities, finds resources and seeks results</p> <p>6. Uses information and technology to solve problems</p> <p>D. A responsible and involved citizen who:</p> <p>2. Accepts responsibility for personal decisions and actions</p> <p>3. Demonstrates ethical behavior and the moral courage to sustain it</p> <p>6. Demonstrates awareness of personal and community health and wellness</p> <p>E. An integrative and informed thinker who:</p> <p>1. Gains and applies knowledge across disciplines and learning contexts and to real-life situations with and without technology</p> <p>2. Evaluates and synthesizes information from multiple sources</p>