

Pre-Manufacturing						
Month Example Sept/Jan	Content Sub-Category or Strand	National Common Core Standards Code & Language	Michigan Standards High School Content Expectations (HSCEs) Code & Language	Essential Skills	Examples of Formative Assessments	Vocabulary
September 2 weeks		48.0508 Welding, Brazing and Soldering. Comply with federal, state and local regulationsto ensure worker safety and health environmental work practices.	1. Assess workplace conditions according to specified safety and health requirements	1A. Identify the types of risk of injury/illness at work, school and home. 1. B Identify those who are susceptible to risk of injury/illness at work. 1. C Describe ways to positively impact occupational safety and health	Written Exams that are kept on file. Students must score and/or achieve 100% on retakes. Appropriate safety media notes kept on file. Appropriate safety media notes kept on file.	Hazmat/Sarah Title III MSDS Bloodborne Pathogens
September 1 week			2. Following appropriate safety procedures, demonstrate methods to correct common hazards	2.A Identify and describe common hazards in the workplace 2. B. Interpret safety signs and symbols 2.C. Identify sources of combustible/flammable materials, fire, and emergencies to establish a fire safe environment	All written related work to safety kept on file Demonstrations by the instructor and student reflecting knowledge and skills Examples of formative assessments	Sexual Harrassment Reuse, Reduce, Recycle, Renew

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September 1 week			3. Demonstrate workplace activities that comply with safety, health, and environmental policies and procedures	3.A Promote and maintain knowledge of organizational safety, health, and environmental management policies and procedures 3. B. Follow organizational policies and procedures 3. C. Educate and orient other workers 3. E Identify, describe, and report workplace hazards	Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance	
October			4. Shielded Metal Arc Welding (SMAW) Principles and Practices	4. A. Perform safety inspections of equipment and accessories 4. B. Make minor external repairs to equipment and accessories 4. C. Set up for shielded metal arc we 4. D. Operate shielded metal arc welding equipment	Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance	

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				4. E. Make fillet welds, all positions, on plain carbon steel 4. F. Make groove welds, all positions, on plain carbon steel 4. G. Perform 2G and 3G, uphill, limited thickness qualification tests on plain carbon steel plain	Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance	
November			5. Gas Metal Arc Welding (GMAW, GMAW-S, GMAW-P) Principles and Practices	5. A. Perform safety inspections of equipment and accessories	Safety Tests, Written Tests, Demonstrations, Projects, Performance	Accurate, Acetone, Accurate, Acetone, acetylene, align, allow, allowing element, backfire,

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				5. B. Make minor external repairs to equipment and accessories	Safety Tests, Written Tests, Demonstrations, Projects, Performance	base metal, bead, brazing filler metal, brittleness, capillary action, carbon steel, carburizing flame
				5. C. Set up for gas metal arc welding operations on plain carbon steel	Safety Tests, Written Tests, Demonstrations, Projects, Performance	color test, combustion, complete fusion, cutting itp, cylinder, defect, deposited metal, depth of fusion, destructive evaluation

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				5. D. Operate gas metal arc welding equipment	Safety Tests, Written Tests, Demonstrations, Projects, Performance	distillation, ductility, edge preparation, ferrous metal, filler metal, flame cutting, flux, hardening
				5. E. Short circuit transfer	Safety Tests, Written Tests, Demonstrations, Projects, Performance	hardness test, heat treatment, inspectionmagnetic test, neutral flame, nonferrous metals

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				5. F. Make fillet welds, all positions, on plain carbon steel	Safety Tests, Written Tests, Demonstrations, Projects, Performance	, orifice, oxygen, quenching, slag, soapstone, soldering, spark lighter, tensile strength
				5. G. Make groove welds, all positions on plain carbon steel	Safety Tests, Written Tests, Demonstrations, Projects, Performance	tension, throttle, tip cleaner, tolerance, vertical position, visual inspection
				5. H. Spray Transfer	Safety Tests, Written Tests, Demonstrations, Projects, Performance	weld joint, welder, welding rod, working drawing

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				5. I. Make 1F and 2F welds on plain carbon steel	Safety Tests, Written Tests, Demonstrations, Projects, Performance	
				5. J. Describe gas metal arc welding-pulse theory	Safety Tests, Written Tests, Demonstrations, Projects, Performance	
December			6. Flux Cored Arc Welding (FCAW-G/GM) Principles and Practices	6. A. Perform safety inspections of equipment and accessories	Safety Tests, Written Tests, Demonstrations, Projects, Performance	AC (alternating current), Allow, Ampere, ARC Blow, ARC Length, ARC Voltage
				6. B. Make minor external repairs to equipment and accessories	Safety Tests, Written Tests, Demonstrations, Projects, Performance	Base Metal, Casehardening, DC (Direct Current),

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				6. C. Set up for flux cored arc welding operations on plain carbon steel	Safety Tests, Written Tests, Demonstrations, Projects, Performance	Ductility, Electrode, Electrode Holder, Gage, Inspection, Lap Jointing
				6. D. Operate flux cored arc welding equipment	Safety Tests, Written Tests, Demonstrations, Projects, Performance	Porosity, Quenching, Reversed Polarity
				6. F. Make fillet welds, all positions, on plain carbon steel	Safety Tests, Written Tests, Demonstrations, Projects, Performance	SAE, Soldering, Spatter, Straight Polarity, Tack Weld, weaving, Wheel Dresser

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				6. G. Make groove welds, all positions, on plain carbon steel	Safety Tests, Written Tests, Demonstrations, Projects, Performance	
December/ January			7. Gas, Tungsten Welding (GTAW) Principles and Practices	7. A. Perform safety inspections of equipment and accessories 7. B. Make minor external repairs to equipment and accessories 7. C. Set up for gas tungsten arc welding operations on plain carbon steel, aluminum, and stainless steel. 7. D. Operate gas tungsten arc welding equipment 7. E. Make fillet welds, all positions, on carbon steel	Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance	

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				7. F. Make groove welds, all positions, on carbon steel 7. G. Make 1F and 2F welds on aluminum 7.H Make 1F, 2F, and 3F welds on stainless steel 7. I. Identify various tungstens and theri uses/applications	Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance	
January			8. Thermal Cutting Principles and Practices	8. A. Perform safety inspections of equipment and accessories 8. B. Make minor external repairs to equipemtn and accessories	Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance	

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				8. C. Set up for manual oxyfuel gas cutting operations on plain carbon steel 8. D. Operate manual oxyfuel gas cutting equipemtn 8. E. Perform straight cutting operations on plain carbon steel 8. F. Perform shape cutting operations on plain carbon steel 8. G. Perform bevel cutting operations on plain carbon steel 8. H. Remove weld metal form plain carbon steel using weld washing techniques	Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance	

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				8. I. Identify various alternative fuels used in weldind and cutting 8. J. Perform safety inspections of equipemtn and accessories 8. K. Make minor external repairs to equipment and accessories 8. L. set up for machine oxyfuel gas cutting (track burner) operations on plain carbon steel 8. M. Operate machine oxyfuel gas cutting (track burner) equipment. 8. N. Perform straight cutting operations on plain carbon steel	Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance	

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				8. O. Perform shape cutting operations on plain carbon steel 8. P. Set up for manual plasma arc cutting operations on plain carbon steel, aluminum, and stainless steel. 8. Q. Operate manual plasma arc cutting equipment 8. R. Perform shape cutting operations on plain carbon steel, aluminum, and stainless steel. 8. S. Operate manual plasma arc cutting equipment 8. T. Perform shape cutting operations on plain carbon steel, aluminum, and stainless steel (gouging)	Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance	

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January			9. Welding Inspection and Testing Principles and Practices	8. U. Perform safety inspections of equipment and accessories. 8. V. Make minor external repairs to equipment accessories 8. W. Set up for manual air carbon arc gouging and cutting operations on plain carbon steel 8. Y. Operate manual air carbon arc cutting equipment 8. X. Perform metal removal operations on plain carbon steel 9. A. Examine cut surfaces and edges of prepared base metal parts	Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance Safety Tests, Written Tests, Demonstrations, Projects, Performance	

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January			10. Demonstrate workplace knowledge and skills common to manufacturing	<p>9. B. Examine tack, intermediate layers, and completed welds</p> <p>10. A. Demonstrate the planning and layout processes (e.g. designing, print reading, measuring) used in manufacturing. (Read prints and use the information to plan, lay out, and produces parts or products)</p> <p>10. B. Summarize how materials can be processed using tools and machines (Use tools and the processes of cutting, shaping, combining, forming, etc. of materials to manufacture a part or product)</p>	<p>Safety Tests, Written Tests, Demonstrations, Projects, Performance</p> <p>Safety Tests, Written Tests, Demonstrations, Projects, Performance</p> <p>Safety Tests, Written Tests, Demonstrations, Projects, Performance</p>	

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				<p>10. C. Describe the various types of assembling processes (e.g. mechanical fastening, mechanical force, joining, fusion bonding, adhesive bonding used in manufacturing. - Apply appropriate fastening or joining procedure to the design and production of a manufactured part or product.</p> <p>10. D. Explain finishing processes (e.g., types of finishing materials, surface preparation, methods of application) used in manufacturing. - Select a finishing process for a product appropriate to the job it must perform, the environment in which it functions, and its aesthetic appeal).</p>	<p>Safety Tests, Written Tests, Demonstrations, Projects, Performance</p> <p>Safety Tests, Written Tests, Demonstrations, Projects, Performance</p>	

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				10. E. Explain the processes of inspection and quality control used in manufacturing. - Perform continuous on line inspections to ensure that parts or products meet design specifications. Explain the importance of Lean Manufacturing and Six Sigma in achieving error-free production of goods and materials.	Safety Tests, Written Tests, Demonstrations, Projects, Performance	
			11. Technical Standards - Job Execution 48.0501	11. A. Manual operations, Benchwork - Develop a process plan for a part requiring milling, drilling, turning, or grinding	Safety Tests, Written Tests, Demonstrations, Projects, Performance	Abrasive, Absolute Positioning, Acme Thread, Allowance, Anvil, Arbor Press, Axis, Base Metal, Bed Length

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				11. B. Manual Operations: Layout the location of hole centers and surfaces within an accuracy of +/- .015.	Safety Tests, Written Tests, Demonstrations, Projects, Performance	Bending Brake, Boring, Box and Pan Brake, CAD/CAM, Calipers, Cap Screw, Carriage, Cartesian Coordinate System
				11. C. Turning Operations: Between Centers Turning - Set up and carry out between centers turning operations for straight turning.	Safety Tests, Written Tests, Demonstrations, Projects, Performance	Center Gage, Chips, Chuck, Collet, Compound Test, Counter bore, Cutting Speed, Datum

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				11. D. Turning Operations: Chucking Setup and Carry out chucking	Safety Tests, Written Tests, Demonstrations, Projects, Performance	Deburring, Dial Indicators, Die, Dogs, Fabricate, Feed, Forge, Foundry, Gage, Gage Blocks
				11. E. Milling: Square Up a Block - Set up and perform squaring up the six surfaces of a block to within +/- .002 and .002 over 4.5"	Safety Tests, Written Tests, Demonstrations, Projects, Performance	Honing, Industrial Engineers, Industrial Technology, Jacobs Chucks, Lathe, Machine Tool

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				11. F. Vertical Milling - Set up and operate vertical milling machine	Safety Tests, Written Tests, Demonstrations, Projects, Performance	Mold, Pattern, Plasma, Precision Layout Tools, Spindle, Statistical Quality Control, Tap, Tensile Strength, Tension, Ultrasonic Energy, UNF, Unified Thread System, Zero Point