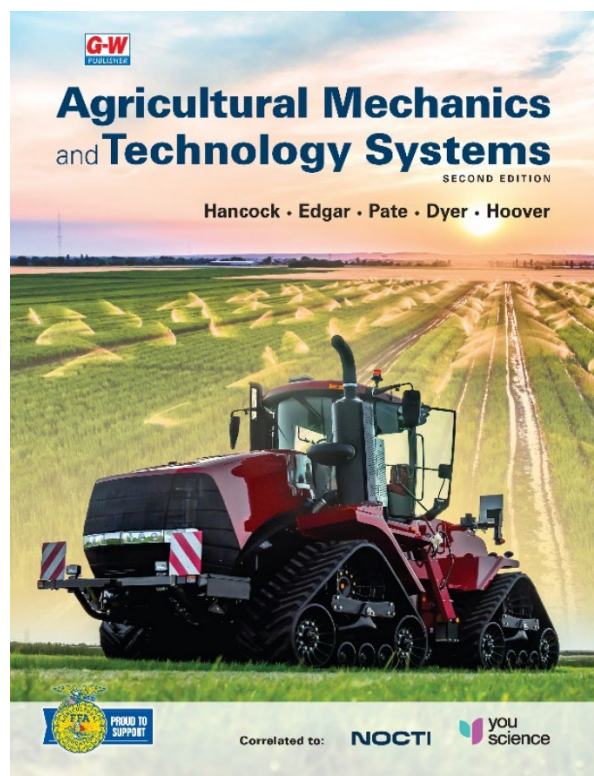


**Correlation of**  
***Agricultural Mechanics and Technology Systems***  
**J.P. Hancock, Don Edgar, Michael Pate, Lori Dyer, Brian Hoover**  
**(Goodheart-Willcox Publisher ©2024)**  
**to**  
**Agricultural Systems and Technology I Exam 110**  
**Precision Exams by YouScience**

Goodheart-Willcox is pleased to partner with Precision Exams by YouScience by correlating *Agricultural Mechanics and Technology Systems* to their Agricultural Systems and Technology I Exam 110 standards. Precision Exams standards and Career Skills Exams were created in concert with industry and subject matter experts to match real-world job skills and marketplace demands. Students that pass the exam and performance portion of the exam can earn a Career Skills Certification.

The correlation chart below lists the standards, objectives, and indicators for the Agricultural Systems and Technology I Exam 110 in the left column. Corresponding content from *Agricultural Mechanics and Technology Systems* that can be used by a student to help achieve the standard, objective, or indicator is listed in the right column.

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Standards / Objectives / Indicators	Textbook Pages
<i>End of Chapter abbreviations: Analyze and Apply AA; Thinking Critically TC; STEM and Academic Activities ST; Communicating about Ag Mechanics CA; SAE for ALL Opportunities SAE OP</i>	
<b>Standard 1</b> Student will participate in personal and leadership development activities through the FFA.	Student Organizations pg. 24 Ag Ed Connection: Employment Skills CDE pg. 26 FFA Leadership Opportunities pg. 42 National FFA Organization pgs. 42–48

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<b>Objective 1</b> Student will use communication skills to communicate with others effectively.	Ag Ed Connection: Employment Skills CDE pg. 26 Maintaining Employment 34 AA 1–2 pg. 38 CA 1–2 pg. 39 SAE OP 1 pg. 39 Career and Leadership Events pg. 47 TC 1–3 pg. 64 CA 1 pg. 65
<b>1</b> Understand when it is appropriate to listen and to speak.	Ag Ed Connection: Employment Skills CDE pg. 26 Answering Interview Questions pg. 32 Maintaining Employment pg. 34 CA 1–2 pg. 39 Career and Leadership Events pg. 47
<b>2</b> Understand and follow verbal and written instructions for classroom and laboratory activities.	Classroom and Laboratory Instruction pg. 41
<b>Objective 2</b> Student will effectively use teamwork to work with others respectfully.	FFA Leadership Opportunities pg. 42 Program of Activities pg. 45
<b>1</b> Identify and understand different roles in working with a team.	FFA Leadership Opportunities pg. 42 Career and Leadership Development Events pg. 47 School-Based Enterprise SAE pg. 53 Service-Learning SAE pg. 54
<b>Objective 3</b> Student will use critical thinking and problem-solving skills. <i>Many of the activities at the end of each chapter also require critical thinking schools.</i>	Thinking Critically questions at end of each chapter: 1–3 pg. 19; 1–3 pg. 38; 1–3 pg. 64; 1–3 pg. 87; 1–2 pg. 116; 1–2 pg. 141; 1–2 pg. 174; 1–2 pg. 214; 1–2 pg. 242; 1–3 pg. 266; 1–3 pg. 291; 1–2 pg. 308; 1–3 pg. 335; 1–3 pg. 361; 1–2 pg. 389; 1–3 pg. 415; 1–3 pg. 445; 1–6 pg. 470; 1–6 pg. 495; 1–2 pg. 521; 1–2 pg. 549; 1–2 pg. 576; 1–2 pg. 598; 1–3 pg. 624; 1–3 pg. 648; 1–2 pg. 673; 1–2 pg. 710; 1–2 pg. 741; 1–2 pg. 779; 1–2 pg. 812; 1–2 pg. 832; 1–2 pg. 848; 1–4 pg. 873; 1–5 pg. 893; 1–2 pg. 912; 1–4 pg. 938; 1–2 pg. 961
<b>1</b> Analyze the cause of the problem.	STEM Connection: The Scientific Method pg. 52  <i>Analyze and Apply activities at the end of each chapter require students to analyze, develop a solution, and apply (implement), as well as evaluate the plan (or any combination thereof).</i>  1–3 pg. 19; 1–3 pg. 38; 1–3 pg. 63; 1–3 pg. 87; 1–3 pg. 115; 1–2 pg. 141; 1–3 pg. 174; 1–3 pg. 213; 1–4 pg. 242; 1–5 pg. 266; 1–4 pg. 291; 1–5 pg. 308; 1–5 pg. 335; 1–3 pg. 361; 1–3 pg. 388; 1–3 pg. 415; 1–7 pg. 445; 1–5 pg. 469; 1–6 pg. 495; 1–3 pg. 521; 1–4 pg. 548; 1–4 pg. 576; 1–2 pg. 598; 1–3 pg. 624; 1–4 pg. 648; 1–3 pg. 673; 1–2 pg. 710; 1–3 pg. 741; 1–2 pg. 779; 1–2 pg. 812; 1–2 pg. 832; 1–2 pg. 848; 1–2 pg. 873; 1–4 pg. 893; 1–3 pg. 912; 1–5 pg. 938; 1–3 pg. 961  <i>Additional activities found in the review and assessment section of each chapter also require the analyzing and applying of knowledge.</i>
<b>2</b> Develop a solution to address the problem.	
<b>3</b> Implement the plan.	
<b>4</b> Evaluate the effectiveness of the plan.	

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<b>5</b> Use generally accepted industry standards to analyze, evaluate, troubleshoot, and diagnose the challenges associated with a specific repair, maintenance, or fabrication project.	Troubleshooting DC Circuits pg. 572 Irrigation System Troubleshooting pg. 642 Engine Troubleshooting pg. 886 SAE #1 pg. 577
<b>Objective 4</b> Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.	Maintaining Employment pgs. 34–36
<b>1</b> Set and meet goals on attendance and punctuality.	Being Punctual pg. 35 Interests and Goals pg. 54 Having a Strong Work Ethic pg. 35
<b>2</b> Prioritize, plan, and manage work to complete assignments and projects on time.	Reading Information and Following Directions pg. 34 Being a Self-Starter pg. 35 SAE OP #4 pg. 39
<b>Objective 5</b> Student will be accountable for results.	SAE Recordkeeping pgs. 58–59
<b>1</b> Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.	SAE Recordkeeping pgs. 58–59
<b>2</b> File a weekly/bi-weekly written report on progress toward completion of assignments and projects.	SAE Recordkeeping pgs. 58–59
<b>Objective 6</b> Be familiar with the legal requirements and expectations of the course.	—
<b>1</b> Be familiar with the course disclosure statement and all requirements for successful completion of the course.	—
<b>2</b> Demonstrate workplace ethics, e.g., fair, honest, disciplined.	Having a strong work ethic pg. 34 FFA Code of Ethics pg. 45
<b>Standard 2</b> Student will participate in work-based learning activities through the Supervised Agricultural Experience (SAE) Program.	CH 3 Experiential Learning through SAEs pgs. 40–65 Supervised Agricultural Experiences pg. 42 Supervised Agricultural Experiences pgs. 48–54 Foundational SAEs pgs. 48–50 Immersion SAEs pgs. 50–54 Placement/Internship SAE pgs. 50–51 Ownership/Entrepreneurship SAE pg. 51 Exploratory SAE pgs. 51–52 Research SAE pgs. 52–53 School-Based Enterprise SAE pg. 53 Service-Learning SAE pg. 54 SAE for ALL Opportunities 1–3 pg. 65 ( <i>these are found at the end of each chapter</i> )

**Correlation of *Agricultural Mechanics and Technology System* to Precision Exams by YouScience Agricultural Systems and Technology I Exam 110—page 4**

Standards / Objectives / Indicators	Textbook Pages
<i>End of Chapter abbreviations: Analyze and Apply AA; Thinking Critically TC; STEM and Academic Activities ST; Communicating about Ag Mechanics CA; SAE for ALL Opportunities SAE OP</i>	
<b>Objective 1</b> Student will demonstrate employability skills.	Matching Your Skills and Interests pg. 23 Skill Documentation pgs. 25–26 Employment Skills LDE pg. 26
1 Use a career search network to find career choices.	Finding a Job in Agricultural Mechanics pgs. 32–34
2 Identify appropriate CTE Pathway for selected career choice.	Foundational SAEs pgs. 48–50 ST #2 pg. 38
3 Write a résumé including a list of demonstrated skills.	Documents pgs. 26–29 Résumé pg. 27
4 Write a letter of application. Complete a job application.	Cover Letter pg. 28 Job Application pg. 29 TC 2 pg. 38 AA 1, 3 pg. 38
5 Participate in an actual or simulated job interview.	Job Interview pgs. 29–32 AA 1, 3 pg. 38 CA 1–2 pg. 29
<b>Objective 2</b> Student will participate in a work-based learning experience outside the classroom.	CH 3 Experiential Learning through SAEs pgs. 40–65
1 Student will plan and implement a Supervised Agricultural Experience Program from at least one of the following areas: ownership/entrepreneurship, placement/internship, research, school-based enterprise, and/or service-learning experiences.	CH 3 Experiential Learning through SAEs pgs. 40–65 Supervised Agricultural Experiences pg. 42 Supervised Agricultural Experiences pgs. 48–54 Foundational SAEs pgs. 48–50 Immersion SAEs pgs. 50–54 Placement/Internship SAE pgs. 50–51 Ownership/Entrepreneurship SAE pg. 51 Exploratory SAE pgs. 51–52 Research SAE pgs. 52–53 School-Based Enterprise SAE pg. 53 Service-Learning SAE pg. 54 SAE for ALL Opportunities 1–3 pg. 65 ( <i>these are found at the end of each chapter</i> )
<b>Objective 3</b> Student will develop a job portfolio specific to their selected work-based learning experience.	Skill Documentation pgs. 25–26
1 Student will keep a personal record/journal/log of their work-based learning experience; including pictures, financial records, skills learned, hours associated with project, goals, reflection, etc.	SAE Recordkeeping pgs. 58–59
<b>Standard 3</b> Student will demonstrate appropriate safety practices in agricultural power, structural, and technical systems in laboratory and work settings.	Chapter 2 Safety and Developing Safe Work Habits pgs. 21–39 Safety First notes throughout textbook (listed in following section)

<p><b>Objective 1</b> Explain the meaning and importance of safety in agricultural power, structural, and technical systems.</p>	<p>Chapter 2 Safety and Developing Safe Work Habits pgs. 21–39</p> <p>Safety Notes Located throughout Text:</p> <p><b>7 Hand Tools:</b> Cutting into an Existing Wall; Wearing PPE When Using a Cold Chisel; Using a File or Rasp; Clamping Force; PPE and Impact Tools; Using the Correct Tool for the Job; Always Use a Scraper; Shop Brushes and Brooms; <b>8 Power Tools:</b> Emergency Shutoff; AC/DC Rating; Extension Cords; NiCad Battery Toxicity; Pneumatic Power Tools; Personal Protective Equipment; Using Nail Guns and Brad Nailers; Hydraulic Jacks and Presses; Circular Saws; Table Saws; Band Saws; Securing the Workpiece; Planers and Jointers; Grinders and Sanders; Die Grinders; Using Compressed Air; <b>9 Materials, Fasteners, and Hardware:</b> Lead-Based Paint; Caustic Concrete; Driving Fasteners and PPE; Using Adhesives; <b>11 Fundamentals of Woodworking:</b> Dull Blades; Using a Miter Saw; Rip Cuts; Sawstop; Cutting and Chiseling; CNC Router; Securing the Wood; <b>12 Designing, Planning, and Constructing Woodworking Projects:</b> Using Compressed Air; Ventilation; <b>13 Land Surveying and Site Analysis:</b> Tripods; Sharp Points; Laser Level Safety; <b>14 Concrete Foundations and Flatwork:</b> Mixing Concrete; Heavy Lifting; <b>15 Masonry:</b> Using the Correct Tool for the Job; Brick Hammers; Muriatic Acid; Hazardous Chemicals; Portland Cement; Mixing Mortar; Mortar Mixer; <b>16 Framing Structures:</b> Work Site Safety (5); Shelter in Bad Weather; Staying Safe; <b>17 Finishing Structures:</b> Carrying and Installing Windows; PPE for Insulation Work; <b>19 Fencing:</b> Working around Livestock; Electric Fence Chargers; Private Property; Calling before Digging; Staying Hydrated; Handling Fence Wire; <b>20 Electric Power:</b> Safety with Electricity; Using the Correct Fuse or Circuit Breaker; Disconnecting the Power; Power Supply; Testing the Conductor; Electronic Testers; <b>21 Wiring AC Circuits:</b> The Proper PPE; Ground Conductor; Disconnecting the Power; Marking Hot Wires; Eye Protection; Junction Boxes; Hardwiring Safety; Connection Protection; Is the Power Off? <b>22 Wiring DC Circuits:</b> Wiring Solar Cells; LED Lights; Soldering Safety; Battery Maintenance; <b>23 Electric Motors and Controls:</b> Using Electric Motors; Disconnecting the Power Supply (2); Eye Protection; Manufacturer’s Specifications; Ground Connection; Keeping Electric Motors Clean; Safety Guards; <b>24 Plumbing Design and Installation:</b> Wearing PPE When Connecting Pipe; Always Wear Eye Protection; Working with Open Flames; Preventing Fires; Gas Pipe System; <b>25 Farm and Landscape Irrigation:</b> Installation Safety; Cutting Pipe; <b>26 Environmental Controls:</b> Fans; Manure Pit and Grain Dust Safety; Lockout/Tagout; Protect the Environment; <b>27 Fundamentals of Metalworking:</b> Pneumatic Hammers; Bolt Cutter Safety; Grinder Safety; Soldering Safety; Did You Read the Label? <b>28 Oxyfuel Welding, Cutting, and Brazing:</b> Propane and LPG Gases; Oxygen Cylinders; Torch Bodies and Attachments; Cutting Tips; Excess Fuel Gas; Concrete Surfaces and Moisture; Use PPE When Cutting; Eye Protection for Oxyfuel Welding; <b>29 Shielded Metal Arc Welding:</b> Arc Welding Safety; Workpiece Connections; Use PPE When Welding; Releasing the Electrode; Performing 3G and 3F Welds; <b>30 Gas Metal and Flux Cored Arc Welding:</b> Changing Electrodes; Steam Hazard; Before You Weld; Call out “Cover!”; <b>31 Gas Tungsten Arc Welding:</b> High-Frequency Electricity; Working with Thorium; Shaping Thoriated Tungsten Electrodes; <b>32 Plasma Cutting:</b> Protect Your Eyes (2); Servicing Plasma Torches; Waste Disposal; <b>33 Internal Combustion Engines:</b> Storing Oil and Fuel Mixture; Safety Data Sheets; Chemical Storage; <b>34 Small Engine Performance, Maintenance, and Troubleshooting:</b> Running Engines; Rotating Forces; Using Compressed Air; Disconnect the Spark Plug Wire; Fire Prevention; <b>35 Power Trains and Power Systems:</b> Power Trains; Transmissions; Hydraulic System Pressure; Power Take-Off! PTO stubs; Chains and Gears; Hydraulic System Pressure; <b>36 Machinery Maintenance and Management:</b> Moving Parts; Flammable Cleaning Agents; High Temperatures and Pressures; Coolant; High-Pressure Common Rail Fuel Systems; Batteries; Neutral Safety Switch; Lockout/Tagout: Electrical Energy; Tractor Ballasting; Storing Equipment; <b>37 Hydraulic and Pneumatic Power</b> Working with Pressurized Systems</p>
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<b>Standards / Objectives / Indicators</b>	<b>Textbook Pages</b>
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<b>1</b> Define safety and describe why it is important.	Chapter 2 Safety and Developing Safe Work Habits pgs. 21–39
<b>2</b> Identify safety hazards, and demonstrate the actions needed to minimize or eliminate risk associated with agricultural power, structural, and technical systems in learning and/or work situations.	Hazards in Agricultural Mechanics and Technology pgs. 90–91
<b>Objective 2</b> Implement safety practices related to agricultural power, structural, and technical systems in learning and work situations.	Safety Regulations pgs. 91–94 Personal Protective Equipment pgs. 94–99 General Safety pgs. 99–104 Shop and Lab Practices That Improve Safety pgs. 101–102
<b>1</b> Identify, select, and properly use appropriate personal protective equipment (PPE).	Personal Protective Equipment pgs. 94–99
<b>2</b> Verify that all equipment is in good operating condition and that appropriate safety devices are in place and working (e.g., guards in place, tool rests adjusted, etc.).	<i>Each tool section includes a list of safety rules, including checking operating condition and ensuring safety devices are in place.</i>
<b>3</b> Maintain neat, well-organized, well-ventilated, and safe work areas.	<i>Each tool section includes a list of safety rules, including the maintenance of work areas.</i>
<b>Objective 3</b> Identify fire hazard conditions and actions to take in case of fire.	Fire Extinguishers pgs. 102–104 Chemical Safety pg. 104
<b>1</b> Explain combustion and identify three conditions necessary for it to occur.	Operating Sequence pg. 854 Four-Stroke Engine Design pgs. 854–857 Two-Stroke Cycle Design pgs. 857–859
<b>2</b> Describe fire prevention in agricultural power, structural, and technical systems.	Fire Extinguishers pgs. 102–104
<b>3</b> Explain classes of fires and appropriate extinguishers.	Fire Extinguishers pgs. 102–104 Figure 5-18
<b>Objective 4</b> Take appropriate actions in an accident or emergency.	First Aid pg. 111
<b>1</b> Demonstrate the use of simple first aid in an accident with an injury.	First Aid pg. 111
<b>2</b> Locate first-aid kits, and investigate their contents and use in power, structural, and technical systems settings.	First Aid pg. 111
<b>3</b> Discuss appropriate safety responses in an accident or emergency.	Weather Hazards pg. 107 Figure 5-21 First Aid pg. 111
<b>Standard 4</b> Students will plan, construct, and appropriately maintain agricultural structures.	

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<b>Objective 1</b> Create and/or use sketches, plans, and specifications for agricultural structures.	The Design Process pgs. 249–250 Drawings and Plans pg. 294 Designing and Planning Metal Projects pgs. 681–683
<b>1</b> Identify symbols and drawing techniques used in creating sketches and plans.	Drawing the Plans pgs. 253–254 Technical Drawings pgs. 254–260
<b>2</b> Use scale measurement and dimensions with sketches and plans.	Drawing to Scale pg. 255
<b>3</b> Identify and interpret different views of a construction drawing.	Types of Technical Drawings pgs. 257–258
<b>4</b> Develop sketches or plans for an agricultural structure.	Drawing the Plans pgs. 253–254
<b>Objective 2</b> Determine materials for agricultural structures.	CH 9 Materials, Fasteners, and Hardware pgs. 215–243
<b>1</b> Identify types and grades of materials used in constructing agricultural structures, including lumber, plywood, manufactured materials (e.g., particle board and wafer board), roofing, insulation, and doors and windows.	Wood pgs. 216–220 Pressure-Treated Lumber pgs. 217–218 Engineered Lumber pgs. 218–220 Plywood pg. 219 Laminated Veneer Lumber pg. 219 Oriented Strand Board pgs. 219–220 Metals pgs. 220–223 Composite Materials pgs. 224–226 Wood Characteristics Chart pgs. 286–287
<b>2</b> Identify fasteners and other devices used in constructing agricultural structures.	Fasteners pgs. 227–233 Hardware pgs. 234–236 Adhesives pgs. 236–237
<b>3</b> Identify dimensions and sizes of materials and fasteners used in agricultural structures.	Dimensional Lumber pgs. 216–218 Quarter-Sawn Lumber pg. 216 Plain-Sawn Lumber pg. 216 Fasteners pgs. 227–233
<b>Objective 3</b> Construct a small agricultural structure or project.	FFA Connection: Woodworking Opportunities pg. 283 Hands-On Ag Mechanics pg. 295
<b>1</b> Identify and demonstrate safe and proper use of common tools used in agricultural construction.	CH 7 Hand Tools pgs. CH 8 Power Tools pgs.
<b>2</b> Select materials for a construction project.	Materials List pg. 295 Selecting Lumber pg. 296
<b>3</b> Prepare a bill of materials for a small structure or project, including a cost estimate.	Materials List pg. 295
<b>4</b> Measure, mark, and cut materials according to plans for an agricultural structure.	Layout pgs. 296–298 Cutting the Project Parts pg. 298

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<b>5</b> Assemble an agricultural structure by properly fitting materials and using fasteners.	Assembling the Project pgs. 298–301 Basic Wood Joints pg. 299 Nails pgs. 299–300 Screws pg. 300 Adhesives pgs. 300–301 Biscuit Joiner pg. 301
<b>6</b> Evaluate a completed structure in terms of plans and quality of work.	Finishing the Project pgs. 301–303
<b>Objective 4</b> Select and use appropriate protective coatings, such as paints and preservatives.	Finishing the Project pgs. 301–303
<b>1</b> Discuss the importance of properly selecting and using paints and preservatives.	Types of Finishes pg. 302
<b>2</b> Identify and use appropriate application methods for coating materials, including surface preparation and safety.	Preparation for Painting and Staining pg. 302
<b>3</b> Maintain painting tools and equipment by proper cleaning, storage, and on-job use.	Preparation for Painting and Staining pg. 302
<b>Standard 5</b> Student will demonstrate basic plumbing knowledge and perform simple plumbing skills.	CH 24 Plumbing Design and Installation pgs. 602–625
<b>Objective 1</b> Demonstrate basic plumbing knowledge and skills.	CH 24 Plumbing Design and Installation pgs. 602–625
<b>1</b> Distinguish plumbing materials and products (copper, iron, steel, PVC, and PEX).	CH 24 Plumbing Design and Installation pgs. 602–625 CH 25 Farm and Landscape Irrigation pgs. 626–
<b>2</b> Describe the meaning and importance of plumbing systems for air, water, wastes, and other fluid-based materials.	Plumbing Systems pgs. 603–608
<b>3</b> Identify components of plumbing supply systems and waste systems, including pipe, tubing, valves, faucets, fittings, and fixtures.	Plumbing Tools pgs. 609–610 Plumbing Pipe pgs. 610–617 Pipe Fittings and Valves pgs. 617–619 Irrigation Lines pgs. 632–633 Pipe Fittings Figure 25-16 pg. 634
<b>4</b> Describe how plumbing system components are sized, and appropriately match sizes to jobs.	Pipe Fittings and Valves pgs. 617–619 Pipe Fittings Figure 25-16 pg. 634
<b>5</b> Prepare a bill of materials for a plumbing job.	Materials List pg. 295
<b>Objective 2</b> Perform simple plumbing jobs.	STEM Connection: Toilets pg. 613
<b>1</b> Identify and select appropriate tools for a plumbing job.	Plumbing Tools pgs. 609–610



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<b>2</b> Measure, cut, fit, and install PVC and/or PEX materials as used in water supply systems.	Repairing Irrigation Pipe pgs. 640–642
<b>3</b> Measure, cut, thread, and install iron or steel pipe materials as used in water supply systems.	Galvanized Pipe pg. 641
<b>4</b> Demonstrate the use of soldering in plumbing applications.	Soldering a New Joint pg. 615
<b>5</b> Repair and maintain plumbing systems.	System Troubleshooting pgs. 642–644
<b>Standard 6</b> Student will select, operate, maintain, and repair small internal combustion engines.	CH 33 Internal Combustion Engines pgs. 852–874 CH 34 Small Engine Performance, Maintenance, and Troubleshooting pg. 875
<b>Objective 1</b> Select and operate internal combustion engines.	<b>CH 33</b> Internal Combustion Engines pgs. 852–874
<b>1</b> Identify components and systems of internal combustion engines.	Engine Components pgs. 860–863 Related Systems pgs. 863–867
<b>2</b> Describe the operation of internal combustion engines by cycle and fuel used.	Four-Stroke Engine Design pgs. 854–857 Two-Stroke Cycle Design pgs. 857–859
<b>3</b> Use the operator’s manual to operate and maintain an engine properly.	Engine Maintenance pgs. 881–885 Service Information pgs. 885–886
<b>4</b> List and explain criteria to use in selecting an engine.	Engine Selection pg. 880
<b>5</b> Obtain and/or prepare the proper fuel for an internal combustion engine.	Fuel and Air System pgs. 883–884
<b>Objective 2</b> Analyze and troubleshoot internal combustion engines.	Engine Maintenance pgs. 881–885 Service Information pgs. 885–886
<b>1</b> Identify the major components of internal combustion engines and the functions of each.	Engine Components pgs. 860–863 Related Systems pgs. 863–867
<b>2</b> Explain the meaning of troubleshooting and list the common engine problems identified/solved by troubleshooting.	Engine Troubleshooting pgs. 886–889
<b>Objective 3</b> Maintain internal combustion engines.	Engine Maintenance pgs. 881–885
<b>1</b> Perform routine maintenance, such as cleaning an engine, changing the oil, and cleaning or replacing the air filter.	Engine Maintenance pgs. 881–885 Maintenance Schedules pg. 881 Lubrication System pgs. 881–882 Fuel and Air System pgs. 883–884 Cooling System pgs. 884–885
<b>2</b> Replace and adjust spark plugs as needed.	Engine Maintenance pgs. 881–885
<b>3</b> Winterize or otherwise prepare an engine for extended storage.	Engine Maintenance pgs. 881–885

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<b>4</b> Practice environmental responsibility through the proper disposal of engine wastes, such as oil and filters.	Engine Maintenance pgs. 881–885
<b>Objective 4</b> Operate small equipment powered by internal combustion engines.	Two-Stroke Cycle Design pgs. 857–859
<b>1</b> Identify safety hazards and practices to follow to assure safe operation with small equipment, including mowers, tillers, blowers, and edgers.	Safety pgs. 867–868
<b>2</b> Explain the meaning and importance of pre-operation inspections, including those of fuel and oil levels, the air system, and the condition of engine components.	Engine Maintenance pgs. 881–885 Maintenance Schedules pg. 881 Lubrication System pgs. 881–882 Fuel and Air System pgs. 883–884 Cooling System pgs. 884–885
<b>3</b> Start and safely operate engine-powered equipment.	Basic Operating Standards pgs. 885–886
<b>Standard 7</b> Students will fabricate with metal.	<b>CH 27</b> Fundamentals of Metalworking pgs. 677–742
<b>Objective 1</b> Explain kinds of metals and their uses.	Metals Commonly Used in Agriculture pgs. 679–681
<b>1</b> Identify kinds of metals by appearance and testing, such as spark testing.	CH 27 Fundamentals of Metalworking pgs. pgs. 677–742
<b>2</b> Classify metals according to characteristics and uses.	Ferrous Metals pgs. 220–222 Nonferrous Metals pgs. 222–223
<b>3</b> Identify, maintain, recondition, and use tools in hot and cold metal work.	CH 27 Fundamentals of Metalworking pgs. 677–742
<b>Objective 2</b> Fabricate with hot and cold metal.	CH 27 Fundamentals of Metalworking pgs. 677–742
<b>1</b> Select and use appropriate safety practices in metal fabrication.	CH 27 Fundamentals of Metalworking pgs. 677–742
<b>2</b> Apply cold metal processes in fabrication, including measuring and marking, cutting, bending, tapping, and threading, filing, and drilling, and riveting.	CH 27 Fundamentals of Metalworking pgs. 677–742
<b>3</b> Discuss the use of hot metal processes, including annealing, tempering, bending, cutting, and hole punching.	CH 27 Fundamentals of Metalworking pgs. 677–742 Annealing pgs. 614, 706 Tempering pg. 705
<b>Objective 3</b> Use shielded metal arc welding (SMAW) processes.	CH 29 Shielded Metal Arc Welding pgs. 743–780
<b>1</b> Set up for SMAW operations on carbon steel.	Equipment pgs. 744–746 Electrodes pgs. 747–749 Joint Types pgs. 749–750
<b>2</b> Start and restart an arc and backfill at the edge while running a bead on carbon steel.	Striking an Arc pg. 765

<b>Standards / Objectives / Indicators</b>	<b>Textbook Pages</b>
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<b>3</b> Build a weld pad on carbon steel in the flat position.	Welding a Practice Pad pgs. 766–768
<b>4</b> Make 1F (flat position-fillet weld) welds on carbon steel.	Welding Positions pgs. 751–753
<b>5</b> Make 2F (horizontal position-fillet weld) welds on carbon steel.	Welding Positions pgs. 751–753
<b>6</b> Make 1G (flat position-groove weld) welds on carbon steel.	Welding Positions pgs. 751–753
<b>7</b> Make 2G (horizontal position-groove weld) welds on carbon steel.	Welding Positions pgs. 751–753
<b>Objective 4</b> Use manual oxyfuel gas cutting processes.	CH 28 Oxyfuel Welding, Cutting, and Brazing pgs. 712–
<b>1</b> Perform safety inspections of equipment and accessories.	Oxyfuel Equipment pgs. 715–722 Using Oxyfuel Equipment Safely pg. 725 Using the Torch pgs. 75–76
<b>2</b> Set up for manual oxyfuel gas cutting operations on carbon steel.	Setting Up the Equipment pg. 726 Lighting the Torch pgs. 726–727
<b>3</b> Perform straight cutting operations on carbon steel.	Using a Cutting Torch pgs. 729–731 Steps in the Cutting Process pgs. 730–731
<b>4</b> Perform shape-cutting operations on carbon steel.	Using a Cutting Torch pgs. 729–731 Steps in the Cutting Process pgs. 730–731
<b>5</b> Perform bevel-cutting operations on carbon steel.	Using a Cutting Torch pgs. 729–731 Steps in the Cutting Process pgs. 730–731
<b>6</b> Pierce a hole through a carbon steel plate.	Using a Cutting Torch pgs. 729–731 Steps in the Cutting Process pgs. 730–731
<b>Objective 5</b> Use gas metal arc welding (GMAW) processes.	CH 30 Gas Metal and Flux Cored Arc Welding pgs. 781–813 Controlling Welding Parameters pgs. 754–759
<b>1</b> Set up for GMAW operations on carbon steel.	Equipment pgs. 744–747 Electrodes pgs. 747–749 Welding Positions pgs. 751–753 Surface Preparation pgs. 753–754
<b>2</b> Start and restart an arc and backfill at the edge while running a bead on carbon steel.	Practice Welding pgs. 765–794 Striking an Arc pg. 765
<b>3</b> Use Short Circuit Transfer welding process to make 1F (flat position-fillet weld) welds on carbon steel.	Methods of Metal Transfer pgs. 792–794 Welding Positions pgs. 751–753
<b>4</b> Use Short Circuit Transfer welding process to make 2F (horizontal position-fillet weld) welds on carbon steel.	Short-Circuit Metal Transfer pg. 792 Welding Positions pgs. 751–753

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5 Use Short Circuit Transfer welding process to make 1G (flat position-groove weld) welds on carbon steel.	Short-Circuit Metal Transfer pg. 792 Welding Positions pgs. 751–753
6 Use Short Circuit Transfer welding process to make 2G (horizontal position-groove weld) welds on carbon steel.	Short-Circuit Metal Transfer pg. 792 Welding Positions pgs. 751–753