Name: _____Air Conditioning, Heating and Refrigeration (47.0201)

Directions:
Evaluate the student by entering the appropriate number to indicate the degree of competency.

Rating Scale (0-6):

- **0 No Exposure** – no experience/knowledge in this area; program/course did not provide instruction in this area
- **1 Unsuccessful Attempt** – unable to meet knowledge or performance criteria and/or required significant assistance
- **2 Partially Demonstrated** – met some of the knowledge or performance criteria with or without minor assistance
- **3 Knowledge Demonstrated** – met knowledge criteria without assistance at least once
- **4 Performance Demonstrated** – met performance criteria without assistance at least once
- **5 Repetitively Demonstrated** – met performance and/or knowledge criteria without assistance on multiple occasions
- **6 Mastered** – successfully applied knowledge or skills in this area to solve related problems independently

0	1	2	3	4	5	6	**A. Appreciate and apply all personal and workplace safety procedures**	**Notes:**
							1. Demonstrate appropriate work place safety practices (e.g., combustibles, electrical, hand tools, power tools, lockout/tagout, fall protection, refrigerants and pressurized gases)	
							2. Identify types, purposes, and operation of fire extinguishers and suppression systems	
							3. Inspect lab for hazards	
							4. Recognize when first aid is needed for occupational injuries and follow proper procedures	
							5. Demonstrate victim removal procedures from an electrical conductor	
							6. Apply MSDS (Material Safety Data Sheet) information to material use	
							7. Adhere to applicable local, state, and federal regulations (EPA [environmental], DOT [moving vehicle] and OSHA [worker safety])	
							Other:	

0	1	2	3	4	5	6	**B. Identify and apply refrigeration principles and practices consistent with industry standards**	**Notes:**
							1. Read and interpret pressure-temperature charts	
							2. Explain principles of refrigeration and heat transfer theory	
							3. Identify refrigerants/oil types and their characteristics and uses	
							4. Operate a gauge manifold set	
							5. Leak-test system	
							6. Evacuate and measure vacuum level to 500 microns	
							7. Recover and recycle refrigerants	
							8. Charge system to manufacturer's specifications	

							9. Describe the operation of refrigeration system accessories (e.g., receivers, accumulators, filter/dryer, sight glasses, and valves)	
							Other:	

0	1	2	3	4	5	6	**C. Identify and apply piping principles and practices**	**Notes:**
							1. Identify tubing and fitting types	
							2. Perform copper tubing operations (e.g., cutting, flaring, soldering, brazing, bending, and swaging)	
							3. Install, repair, and replace aluminum tubing	
							4. Install and replace PVC tubing and pipe	
							5. Perform gas pipe operations (e.g., cutting, reaming, threading, and connecting)	
							Other:	

0	1	2	3	4	5	6	**D. Apply basic electrical theory to construct circuits and solve electrical circuit problems**	**Notes:**
							1. Apply the principles of alternating and direct current	
							2. Differentiate between common single- and three-phase voltage systems (e.g., 240V, 60Hz, single-phase; 208V, 60Hz, three-phase; 240V, 60Hz, three-phase; and 480V, 60Hz, three-phase systems)	
							3. Read and interpret voltage, ampere, ohm, and watt meters	
							4. Read and interpret electrical schematic and wiring diagrams	
							5. Install electrical power and control circuits	
							6. Apply the Ohm's law principles as related to series, parallel, and series-parallel circuits	
							7. Apply the principles of electrical circuit protection (e.g., fuses, circuit breakers, disconnect switches, and grounds)	
							Other:	

0	1	2	3	4	5	6	**E. Identify and apply electric motor principles and practices consistent with industry standards**	**Notes:**
							1. Apply the operating principles of electric motors	
							2. Recognize the application of various types of electric motors	
							3. Recognize the application of various types of capacitors	
							4. Test capacitors	
							5. Explain the principles and operation of electric motor protective devices	
							6. Interpret electric motor specifications (e.g., horsepower and voltage)	

							7. Install and connect electric motors	
							Other:	

0	1	2	3	4	5	6	**F. Apply the principles of control systems consistent with industry and safety standards**	**Notes:**
							1. Apply the principles of safety devices and operating control circuits (e.g. pressure switches and thermostats)	
							2. Apply the principles of electromechanical control devices (e.g., relays, contractors, magnetic starters, timers and sequences)	
							3. Apply the principles of electronic control devices (e.g., ignition modules and electronic timers)	
							4. Install/service mechanical control devices (e.g., pneumatic and water controls)	
							5. Install/service electromechanical control devices	
							6. Install/replace transformers	
							Other:	

0	1	2	3	4	5	6	**G. Install and repair residential/light commercial cooling/heating systems consistent with industry and safety standards**	**Notes:**
							1. Install or replace compressor	
							2. Install or replace condensing unit	
							3. Repair or replace condenser	
							4. Repair or replace evaporator	
							5. Replace, repair, and adjust metering devices	
							6. Clean up a contaminated system	
							7. Describe operation of a heat pump	
							8. Describe zoned heating and cooling systems	
							9. Start and check residential heating and cooling systems	
							10. Measure and adjust conditioned air flow	
							11. Describe vacuum pump and micron gauge applications	
							12. Repair, replace, and service electronic air cleaner	
							13. Pump down unit	
							Other:	

0	1	2	3	4	5	6	**H. Perform preventive maintenance on residential/light commercial cooling/heating systems**	**Notes:**
							1. Perform preventive maintenance on air-conditioning systems	
							2. Perform preventive maintenance on heating systems	
							3. Perform preventive maintenance on heat pumps	
							Other:	

0	1	2	3	4	5	6	**I. Install air distribution system consistent with industry and safety standards**	**Notes:**
							1. Design air-distribution system	
							2. Fabricate, insulate, and install air-distribution systems	
							3. Size and assemble vents	
							Other:	

0	1	2	3	4	5	6	**J. Troubleshoot residential/light commercial cooling/heating systems**	**Notes:**
							1. Troubleshoot control devices (e.g., mechanical, electromechanical and electronic)	
							2. Analyze compressor operation (e.g., electrical and mechanical)	
							3. Analyze and replace a four-way reversing valve	
							4. Troubleshoot electric motors	
							5. Troubleshoot LP and natural gas fired heating systems	
							6. Troubleshoot electric heating systems	
							7. Troubleshoot heat pumps	
							8. Troubleshoot oil-fired heating systems	
							9. Troubleshoot air-conditioning systems	
							Other:	

0	1	2	3	4	5	6	**K. Demonstrate professional customer relations skills**	**Notes:**
							1. Explain operation of the system's thermostat	
							2. Communicate system operation in lay terms	
							Other:	

0	1	2	3	4	5	6	**L. Demonstrate leadership skills in the classroom, industry, and society**	**Notes:**
							1. Demonstrate an understanding of SkillsUSA, its structure and activities	

							2. Demonstrate an understanding of one's personal values	
							3. Perform tasks related to effective personal management skills	
							4. Demonstrate interpersonal skills	
							5. Demonstrate etiquette and courtesy	
							6. Demonstrate effectiveness in oral and written communication	
							7. Develop and maintain a code of professional ethics	
							8. Maintain an appropriate professional appearance	
							9. Perform basic tasks related to securing and terminating employment	
							10. Perform basic parliamentary procedures in a group meeting	
							Other:	

0	**1**	**2**	**3**	**4**	**5**	**6**	**M. Explain and demonstrate skills in a specialization area identified by the instructor**	**Notes:**
							1.	
							2.	
							3.	
							Other:	