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| **CONTENT STANDARD 1.0: TRADE MATH** | |
| **Performance Standard 1.1: Basic Math** | |
| 1.1.1 | Perform addition, subtraction, multiplication, and division calculations of whole numbers. |
| 1.1.2 | Perform addition and subtraction calculations of common fractions. |
| 1.1.3 | Perform multiplication and division calculations of common fractions. |
| 1.1.4 | Perform addition, subtraction, multiplication, and division calculations of decimal fractions. |
| 1.1.5 | Perform ratio and proportion calculations. |
| 1.1.6 | Perform percent, percentage, and discount calculations. |
| 1.1.7 | Perform angular, length, and converted temperature measure calculations. |
| 1.1.8 | Perform area calculations. |
| 1.1.9 | Perform volume calculations. |
| 1.1.10 | Solve basic equations. |
| 1.1.11 | Demonstrate the use of order of operations. |
| **CONTENT STANDARD 2.0: GENERAL SAFETY** | |
| **Performance Standard 2.1: Workplace Safety** | |
| 2.1.1 | Describe potential excavation site hazards. |
| 2.1.2 | Explain proper personal protective equipment (PPE) use. |
| 2.1.3 | Describe proper material handling, storage, use, and disposal. |
| 2.1.4 | Describe ladder, stairway, and scaffold hazards and proper use. |
| 2.1.5 | Describe jobsite electrical hazards and proper lockout/tagout use. |
| 2.1.6 | Describe proper refrigerant and pressure vessel usage and storage. |
| 2.1.7 | Identify safety data sheets (SDS) properties of chemicals specific to HVAC. |
| 2.1.8 | Identify and describe environmental hazards (e.g. lead, silica, asbestos, carbon monoxide). |
| 2.1.9 | Identify the hazards associated with confined spaces. |
| 2.1.10 | Use appropriate fire extinguishers and other such safety devices. |
| 2.1.11 | Identify the importance safety procedures for brazing and soldering. |
| **CONTENT STANDARD 3.0: TOOLS AND MATERIALS** | |
| **Performance Standard 3.1: Power and Hand Tool Use** | |
| 3.1.1 | Describe proper hand tool use. |
| 3.1.2 | Describe proper power tool use. |
| 3.1.3 | Identify proper use of various types of torches. |
| 3.1.4 | Identify proper use of piping and tubing fabrication tools. |
| **Performance Standard 3.2: Tubing and Piping** | |
| 3.2.1 | Identify the purpose of the piping, tubing and fittings used in the heating, air-conditioning, and refrigeration industry. |
| 3.2.2 | Identify appropriate brazing and soldering alloys and materials. |
| 3.2.3 | Explain the purposes and procedures for protecting piping materials and fabrication, such as valves, fittings, and products from heat. |
| **CONTENT STANDARD 4.0: ENERGY SOURCES** | |
| **Performance Standard 4.1: Energy Sources** | |
| 4.1.1 | Explain natural, LP gas, and fuel oil combustion characteristics. |
| 4.1.2 | Describe the application of geothermal systems. |
| 4.1.3 | Describe the application of renewable energy systems. |
| 4.1.4 | Describe the application of electric production systems. |
| **CONTENT STANDARD 5.0: BASIC SYSTEMS OVERVIEW** | |
| **Performance Standard 5.1: Basic Systems Overview** | |
| 5.1.1 | Describe fossil-fuel and electrical furnace operations. |
| 5.1.2 | Describe the typical configuration of residential split air conditioning systems. |
| 5.1.3 | List various types of commercial air conditioning systems and their application. |
| 5.1.4 | Describe the configuration of common duct systems. |
| **CONTENT STANDARD 6.0: INTRO TO APPLIED SCIENCE** | |
| **Performance Standard 6.1: Intro to Applied Science** | |
| 6.1.1 | Perform energy conversion calculations. |
| 6.1.2 | Perform sensible, latent, and total heat calculations. |
| 6.1.3 | Differentiate between saturated, superheated, and subcooled refrigerant. |
| 6.1.4 | Explain atmospheric, absolute, and gauge pressure relationship. |
| 6.1.5 | Convert gauge pressure, absolute pressure, and vacuum. |
| 6.1.6 | Diagram a basic refrigeration cycle identifying pressure, temperature, and state of refrigerant. |
| 6.1.7 | List the type and function of the four major refrigeration components. |
| 6.1.8 | Describe the methods of heat transfer. |
| **CONTENT STANDARD 7.0: APPLIANCE INSTALLATION** | |
| **Performance Standard 7.1: Appliance Installation** | |
| 7.1.1 | Apply NEC standards to HVAC electrical circuit installations. |
| 7.1.2 | Interpret HVAC manufacturer electrical name plate data. |
| 7.1.3 | Apply appropriate code standards. |
| 7.1.4 | Describe gas, oil, and electrical appliance installation, start-up, and checkout procedures. |
| 7.1.5 | Describe sheet metal, fiberglass, and flex duct installation procedures. |
| 7.1.6 | Describe split and packaged air conditioning system installation, start-up, and checkout procedures. |
| **CONTENT STANDARD 8.0: INTRODUCTION TO CONSTRUCTION DRAWINGS AND SPECIFICATIONS** | |
| **Performance Standard 8.1: Introduction to Construction Drawings and Specifications** | |
| 8.1.1 | Identify the application of architectural plans and specifications. |
| 8.1.2 | Interpret mechanical, plumbing, and electrical drawing symbols. |
| 8.1.3 | Interpret specification documents and apply to plans. |
| 8.1.4 | Interpret shop drawings and apply to plans and specifications. |
| 8.1.5 | Describe a submittal and its derivation, routing, and makeup. |
| 8.1.6 | Develop cut lists for duct runs from shop drawings. |
| 8.1.7 | Interpret as-built modifications on HVAC mechanical plans. |
| 8.1.8 | Perform HVAC equipment and material takeoff. |
| **CONTENT STANDARD 9.0: BASIC ELECTRICITY** | |
| **Performance Standard 9.1: Basic Electricity** | |
| 9.1.1 | Describe basic electrical theory. |
| 9.1.2 | Describe series, parallel, and combination circuit characteristics. |
| 9.1.3 | Calculate electrical circuit values. |
| 9.1.4 | Describe electrical meter functions. |
| 9.1.5 | Measure electrical circuit values. |
| 9.1.6 | Identify electrical symbols. |
| 9.1.7 | Draw basic HVAC electrical circuit diagrams. |
| 9.1.8 | Interpret basic residential HVAC schematic diagrams. |
| 9.1.9 | Interpret basic commercial HVAC schematic diagrams. |
| 9.1.10 | Explain AC circuit characteristics. |
| 9.1.11 | Describe power distribution transformer systems. |
| 9.1.12 | Calculate HVAC branch circuit conductor, breaker, and disconnect sizes. |
| 9.1.13 | Describe basic motor theory. |
| 9.1.14 | Describe the five single-phase motor types. |
| 9.1.15 | Identify single-phase motor diagrams. |
| 9.1.16 | Explain single-phase motor starting relay operation. |
| 9.1.17 | Calculate motor capacitor replacement values. |
| 9.1.18 | Explain three-phase motor operation. |
| 9.1.19 | Explain ECM motor operation. |
| 9.1.20 | Perform Ohm’s law calculations to series, parallel, and combination circuits. |