

## Crosswalk to HVAC Excellence Competencies and Tasks

The following HVAC Excellence competencies and tasks are covered in this publication. Only the covered competencies and tasks are listed. The first column identifies the competency or task by name. The second column identifies the exact location in this MAVCC publication where that competency or task is covered.

HVAC Excellence Competencies and/or Tasks	MAVCC Objectives and Tasks
<b>Core Competencies</b>	
<b>Mathematics for HVACR:</b>	
<ul style="list-style-type: none"> <li>• Demonstrate proficiency in solving equations</li> </ul>	Unit 1, Assignment Sheet 1 — Calculate the weight of the air in a residence and the amount of heat required to warm the house Unit 1, Assignment Sheet 2 — Calculate the amount of heat being transferred into the house by a heating system Unit 1, Assignment Sheet 3 — Calculate the amount of sensible heat being taken out of the air by an air conditioner Unit 2, Assignment Sheet 2 — Use the sensible heat formula to calculate the output in BTUs of a heating system Unit 2, Assignment Sheet 3 — Use the temperature rise formula to calculate the CFM output of an electric furnace air handler for a heat pump system Unit 2, Assignment Sheet 4 — Use the temperature rise formula to calculate the CFM output of a gas furnace Unit 2, Assignment Sheet 5 — Calculate the total heat being transferred by a cooling system Unit 2, Assignment Sheet 6 — Plot the process line, find the sensible heat ratio, and calculate how much of the total heat being transferred by a cooling system is sensible heat and how much is latent heat

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<ul style="list-style-type: none"> <li>Calculate <math>\Delta T</math></li> </ul>	Unit 2, Objective 8 — The sensible heat formula Unit 2, Objective 9 — The temperature rise formula Unit 2, Objective 10 — Total heat Unit 2, Assignment Sheet 2 — Use the sensible heat formula to calculate the output in BTUs of a heating system Unit 2, Assignment Sheet 3 — Use the temperature rise formula to calculate the CFM output of an electric furnace air handler for a heat pump system Unit 2, Assignment Sheet 4 — Use the temperature rise formula to calculate the CFM output of a gas furnace Unit 2, Assignment Sheet 5 — Calculate the total heat being transferred by a cooling system
<ul style="list-style-type: none"> <li>Understand and demonstrate knowledge of proper duct sizing</li> </ul>	Unit 4, Objective 2 — Air distribution system design Unit 4, Objective 3 — Major steps in air distribution system design Unit 4, Objective 4 — Air distribution system selection factors Unit 4, Objective 5 — Airflow through an air distribution system Unit 4, Objective 6 — Velocity, CFM, and static pressure Unit 4, Objective 7 — Factors affecting air distribution system design Unit 4, Objective 8 — Factors to consider in the distribution of conditioned air Unit 4, Objective 9 — Types of supply duct systems Unit 4, Objective 15 — Friction charts, equivalency tables, and duct calculators Unit 4, Assignment Sheet 1 — Determine the effective length of selected duct runs Unit 4, Assignment Sheet 2 — Determine the friction rate design value to be used for sizing ducts for a specified system Unit 4, Assignment Sheet 3 — Determine duct sizes using a friction chart and ACCA manual D duct sizing worksheet Unit 4, Assignment Sheet 4 — Determine duct sizes using a duct calculator Unit 4, Assignment Sheet 5 — Design an air distribution system

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<ul style="list-style-type: none"> <li>Explain the process and demonstrate the ability to calculate heat loss and gain for single family dwelling and residential duplex/two flat</li> </ul>	Unit 3, Objective 2 — Heat loads Unit 3, Objective 5 — Heat losses and gains Unit 3, Job Sheet 1 — Calculate the heat loss and gain for the whole house and room by room
<b>Heat (Gas and/or Electric)</b>	
<b>Theory and Application:</b>	
<ul style="list-style-type: none"> <li>Identify the formula for sensible heat</li> </ul>	Unit 2, Objective 8 — The sensible heat formula Unit 2, Assignment Sheet 2 — Use the sensible heat formula to calculate the output in BTUs of a heating system
<ul style="list-style-type: none"> <li>Describe and demonstrate the method of measuring static pressure</li> </ul>	Unit 4, Objective 6 — Velocity, CFM, and static pressure Unit 4, Job Sheet 1 — Determine the static pressure drop across an evaporator coil
<ul style="list-style-type: none"> <li>Describe the effects of relative humidity on comfort and health</li> </ul>	Unit 1, Objective 3 — Comfort envelope Unit 1, Objective 6 — Conditioning the air Unit 1, Objective 12 — Density of moist air Unit 1, Objective 14 — Relative humidity Unit 2, Job Sheet 1- Determine the relative humidity of a conditioned space Unit 8, Objective 9 — Advantages of maintaining proper humidity in a residence
<ul style="list-style-type: none"> <li>Describe sensible and latent heat</li> </ul>	Unit 2, Objective 2 — Creating comfort conditions Unit 2, Objective 8 — The sensible heat formula Unit 2, Objective 10 — Total heat Unit 2, Objective 12 — Sensible heat versus latent heat Unit 2, Assignment Sheet 2 — Use the sensible heat formula to calculate the output in BTUs of a heating system Unit 2, Assignment Sheet 5 — Calculate the total heat being transferred by a cooling system Unit 2, Assignment Sheet 6 — Plot the process line, find the sensible heat ratio, and calculate how much of the total heat being transferred by a cooling system is sensible heat and how much is latent heat
<ul style="list-style-type: none"> <li>Define BTU</li> </ul>	Unit 1, Objective 4 — Laws of thermodynamics

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<ul style="list-style-type: none"> <li>Describe the principles of dehumidification and humidification</li> </ul>	Unit 3, Objective 15 — Calculating requirements for humidification loads and internal gains Unit 8, Objective 9 — Advantages of maintaining proper humidity in a residence Unit 8, Objective 10 — Factors affecting humidity in a residence Unit 8, Objective 11 — Operation of a typical humidifier with a forced air furnace Unit 8, Objective 12 — Operation of a dehumidifier
<b>Air Flow:</b>	
<ul style="list-style-type: none"> <li>Describe and measure temperature rise</li> </ul>	Unit 2, Objective 9 — The temperature rise formula Unit 2, Assignment Sheet 3 — Use the temperature rise formula to calculate the CFM output of an electric furnace air handler for a heat pump system Unit 2, Assignment Sheet 4 — Use the temperature rise formula to calculate the CFM output of a gas furnace
<ul style="list-style-type: none"> <li>Explain the procedure for determining CFM and demonstrate</li> </ul>	Unit 2, Objective 8 — The sensible heat formula Unit 2, Objective 9 — The temperature rise formula Unit 2, Assignment Sheet 3 — Use the temperature rise formula to calculate the CFM output of an electric furnace air handler for a heat pump system Unit 2, Assignment Sheet 4 — Use the temperature rise formula to calculate the CFM output of a gas furnace Unit 4, Objective 6 — Velocity, CFM, and static pressure Unit 4, Job Sheet 2 — Determine the CFM being delivered by a selected forced air system
<ul style="list-style-type: none"> <li>Describe the effects of static pressure on air flow and demonstrate</li> </ul>	Unit 4, Objective 6 — Velocity, CFM, and static pressure Unit 4, Job Sheet 1 — Determine static pressure drop across an evaporator coil
<ul style="list-style-type: none"> <li>State the recommended air velocities throughout the supply and return duct system</li> </ul>	Unit 4, Objective 8 — Factors to consider in the distribution of conditioned air Unit 4, Objective 10 — Locations of supply air outlets and recommended velocities

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<ul style="list-style-type: none"> <li>Measure air velocities throughout the supply and return duct system</li> </ul>	Unit 4, Assignment Sheet 3 — Determine duct sizes using a friction chart and ACCA manual D duct sizing worksheet Unit 4, Assignment Sheet 4 — Determine duct sizes using a duct calculator Unit 4, Assignment Sheet 5 — Design an air distribution system Unit 4, Job Sheet 2 — Determine the CFM being delivered by a selected forced air system
<ul style="list-style-type: none"> <li>Describe the construction and efficiencies of varying filtering media and systems</li> </ul>	Unit 8, Objective 4 — Air contaminants that affect humans Unit 8, Objective 5 — Measuring the efficiency of HVAC filters Unit 8, Objective 6 — Efficiency of particle removing filters Unit 8, Objective 7 — Installation and service of HVAC filters Unit 8, Job Sheet 1 — Clean or replace filters in a residential HVAC system
<ul style="list-style-type: none"> <li>Describe, fabricate and install various types of duct connectors</li> </ul>	Unit 5, Objective 6 — Sealing ducts Unit 6, Objective 4 — Assembling sheet metal ducts Unit 6, Objective 5 — Installing sheet metal ducts Unit 6, Objective 6 — Sealing sheet metal ducts Unit 6, Job Sheet 1 — Assemble, install, and seal sheet metal ducts Unit 7, Objective 4 — Fabricating duct board system components Unit 7, Objective 5 — Installing fiberglass duct board components Unit 7, Objective 6 — Installing flex ducts Unit 7, Job Sheet 1 — Fabricate a one-piece straight duct board section using the V-groove method Unit 7, Job Sheet 2 — Fabricate an end cap to fit a one-piece straight duct board section Unit 7, Job Sheet 3 — Install a section of flex duct
<ul style="list-style-type: none"> <li>Describe “R” values and noise reduction elements of various duct materials</li> </ul>	Unit 5, Objective 4 — Conduction losses and gains of ducts Unit 5, Job Sheet 1 — Evaluate a duct system Unit 6, Objective 7 — Insulating sheet metal ducts Unit 6, Objective 8 — Insulation used on the outside of sheet metal ducts Unit 6, Objective 9 — Insulation used on the inside of sheet metal ducts

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<b>Air Conditioning</b>	
<b>Fundamentals and Theory:</b>	
<ul style="list-style-type: none"> <li>Describe the laws of thermodynamics</li> </ul>	Unit 1, Objective 4 — Laws of thermodynamics
<ul style="list-style-type: none"> <li>Describe and demonstrate convection, conduction, and radiation</li> </ul>	Unit 1, Objective 5 — Heat transfer Unit 1, Assignment Sheet 2 — Calculate the amount of heat being transferred into the house by a heating system
<ul style="list-style-type: none"> <li>Define enthalpy</li> </ul>	Unit 2, Objective 3 — The psychrometric chart
<ul style="list-style-type: none"> <li>Explain the condensation of a vapor, and its effect on heat</li> </ul>	Unit 1, Objective 13 — Water vapor
<ul style="list-style-type: none"> <li>Explain and demonstrate vaporization of a liquid, and its effect on heat</li> </ul>	Unit 1, Objective 13 — Water vapor Unit 1, Job Sheet 3 — Calculate the amount of sensible heat being taken out of the air by an air conditioner
<ul style="list-style-type: none"> <li>Describe the principles of dehumidification and humidification</li> </ul>	Unit 3, Objective 15 — Calculating requirements for humidification loads and internal gains Unit 8, Objective 9 — Advantages of maintaining proper humidity in a residence Unit 8, Objective 10 — Factors affecting humidity in a residence Unit 8, Objective 11 — Operation of a typical humidifier with a forced air furnace Unit 8, Objective 12 — Operation of a dehumidifier
<ul style="list-style-type: none"> <li>Describe and define the following:               <ul style="list-style-type: none"> <li>— BTU</li> <li>— latent heat</li> <li>— sensible heat</li> <li>— sub-cooled liquid and superheated vapor</li> <li>— dry and wet bulb temperatures</li> <li>— dew point</li> </ul> </li> </ul>	Unit 1, Objective 4 — Laws of thermodynamics Unit 2, Objective 2 — Creating comfort conditions Unit 2, Objective 12 — Sensible heat versus latent heat Unit 2, Objective 10 — Total heat Unit 2, Objective 12 — Sensible heat versus latent heat Unit 1, Objective 13 — Water vapor Unit 1, Objective 14 — Relative humidity Unit 2, Objective 3 — The psychrometric chart Unit 1, Objective 13 — Water vapor