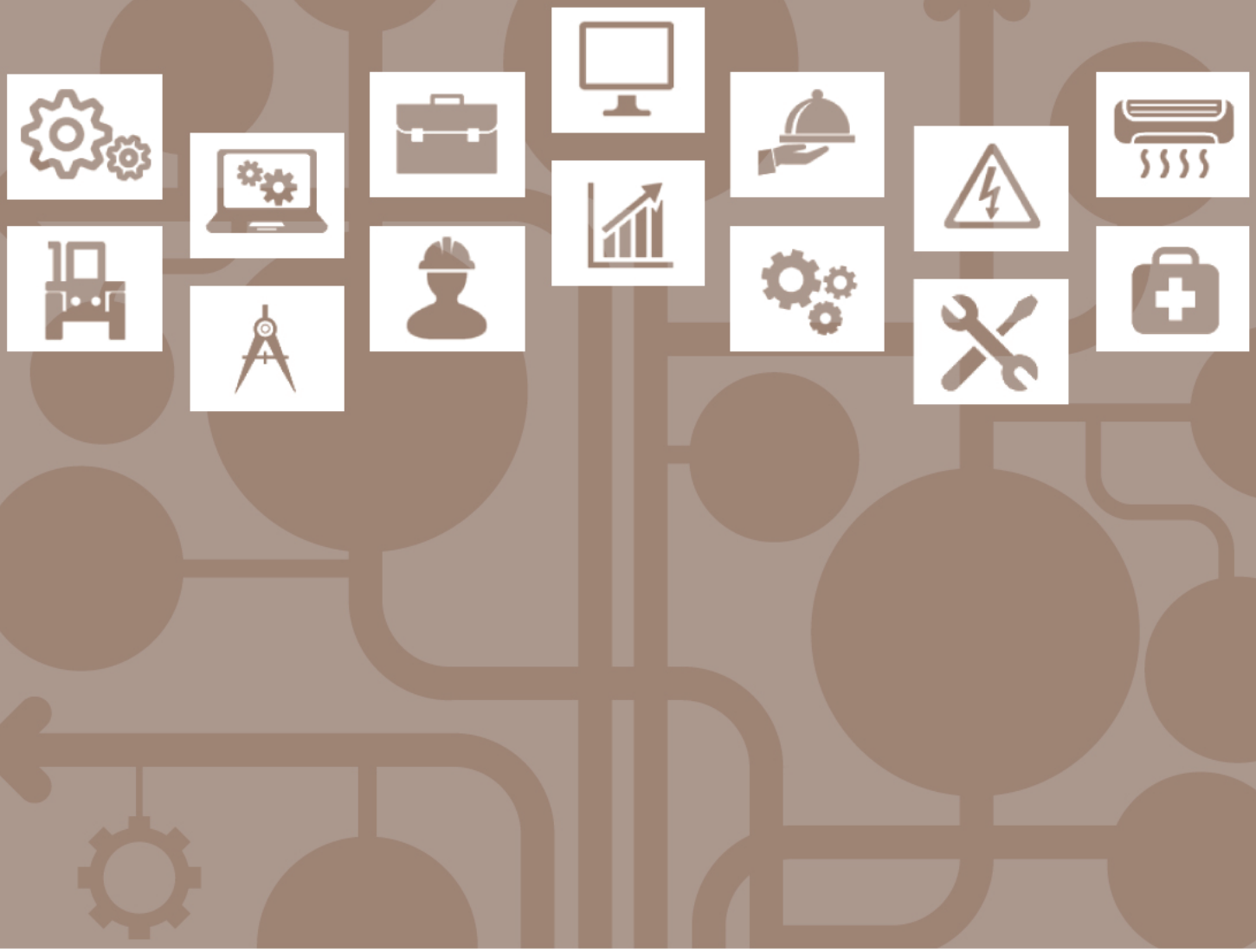
Nocti Business Solutions®
Your Corporate Assessment Provider
www.noctibusiness.com

Entry Level Assessment Blueprint

HVACR - Installation and Start-Up



Test Code: 2111 / Version: 01

Specific Competencies and Skills Tested in this Assessment:

OSHA Guidelines and General Safety

- Apply personal and environmental safety procedures, including personal protective equipment (PPE)
- Demonstrate understanding of fire protection equipment and procedures
- Demonstrate knowledge of electrical safety procedures
- Demonstrate knowledge of HVAC-specific safety procedures

Related Math, Building Science, Blueprints, and Tools

- Demonstrate understanding of modes of heat transfer and British Thermal Unit (BTU)
- Measure with a ruler, correctly identify fractions
- Calculate GPM, CFM, and CFM per ton
- Understand the properties of air
- Accurately interpret blueprints and electrical diagrams
- Identify, use, and maintain hand and power tools

Electricity

- Demonstrate understanding of basic electrical theory and codes
- Exhibit knowledge of series and parallel circuits
- Identify, install, and test various electrical circuits and components (thermostats, transformers, fuses, relays, etc.)

Pipe Fitting, Soldering, and Brazing

- Solder and/or braze, and leak test tubings and fittings
- Set up and operate torch and equipment
- Properly use various piping and tubing types and fittings

Specific Competencies and Skills continued:

Airflow and Ductwork

- Identify proper duct design and sizing
- Understand how to fabricate a fiberglass or metal duct
- Understand how to install duct, fasteners, supports, and hangers
- Understand how to insulate ducts
- Identify duct fabrication tools

Warm Air Systems

- Demonstrate understanding of sequence of operation
- Properly set up and adjust warm air equipment, including verification of ignition and flame proving devices
- Understand flue installation and sizing, adhering to appropriate gas codes

Hydronic Systems

- Demonstrate understanding of hydronic system operation
- Demonstrate understanding of hydronic operating pressures and temperatures

Air Conditioning – Residential

- Identify refrigerants by pressure and temperature relationship
- Identify system components and metering devices
- Measure system temperatures and pressures, including sub-cooling and superheat
- Understand how to recover, pressure-test, evacuate, and charge an air conditioning system, according to EPA 608 Clean Air Act requirements

Heat Pumps, Electric Heat

- Demonstrate understanding of proper operation of heat pump system, reversing valve, defrost controls, and various other component functions
- Install and wire auxiliary/emergency heat, including outdoor thermostats
- Identify types of heat pumps (water source, air-to-air, dual fuel)

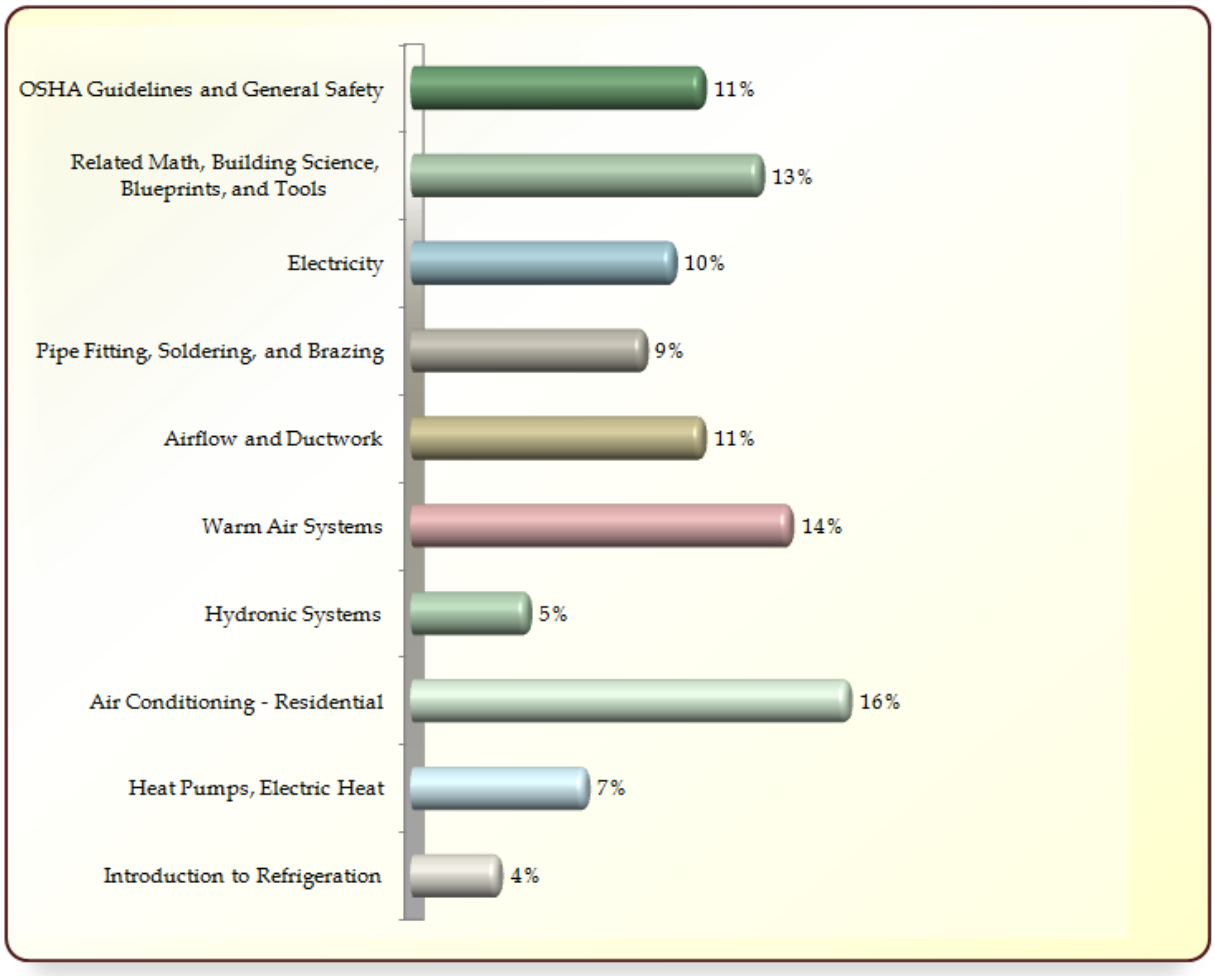
Introduction to Refrigeration

- Demonstrate knowledge of refrigeration components
- Identify various types of refrigeration systems

Written Assessment:

Administration Time: 3 hours
Number of Questions: 143

Areas Covered:



Sample Questions:

When referring to wire size, the larger the gauge number, the
A. larger the diameter of wire
B. smaller the diameter of wire
C. larger the ampacity
D. thicker the insulation

When closing duct board, the staple configuration is a/an _____ staple.
A. 9/16-inch carpet
B. ceiling
C. outward-clinch
D. inward-clinch

What is the color code of a tank of R-410A refrigerant?
A. white
B. green
C. sky blue
D. rose

Reciprocating compressors are cooled by
A. liquid refrigerant
B. suction vapor
C. discharge gas
D. subcooled refrigerant

In a gas burner system, the color of a correctly adjusted natural gas flame is
A. blue
B. green
C. red
D. yellow

Performance Assessment:

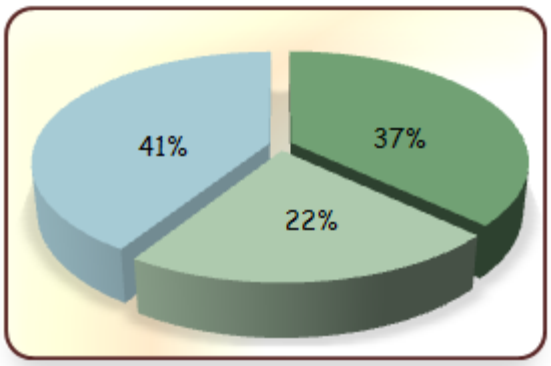
Administration Time: 2 hours and 25 minutes
Number of Jobs: 3

Areas Covered:

37% **Brazing and Soldering**
Safety, check operation and pressure, start unit, record measurements, problem identification, explain correction procedure, problem correction, and time to complete Job 1.

22% **Refrigerant Recovery**
Adjust manifold gauges, install gauges properly and safely, purge manifold gauge hoses, adjust/set position of service valves to read pressures, recover refrigerant, complete System Conditions information sheet for Job 2, and time to complete Job 2.

41% **Gas Furnace Start-Up and Check-Out**
Test, verify, adjust incoming gas pressure, leak test gas connections, check electrical connections, check unit supply voltage, install digital (electronic) thermostat, start equipment, test and adjust burner manifold pressure, check fan motor amperage draw, test and adjust temperature rise, perform steady-state efficiency test, calculate unit cfm, complete System Operations Sheet for Job 3, and time to complete Job 3.



Sample Job: Refrigerant Recovery

Maximum Time: 30 minutes

Participant Activity: The participant will secure the required materials, tools, and equipment, adjust manifold gauges, install gauges properly and safely, purge manifold gauge hoses using *De minimis venting*, adjust/set position of service valves to read pressures or other pertinent conditions, recover the refrigerant using a recovery unit and DOT 49 cylinder utilizing the *vapor recovery* method, and complete the System Conditions information sheet.