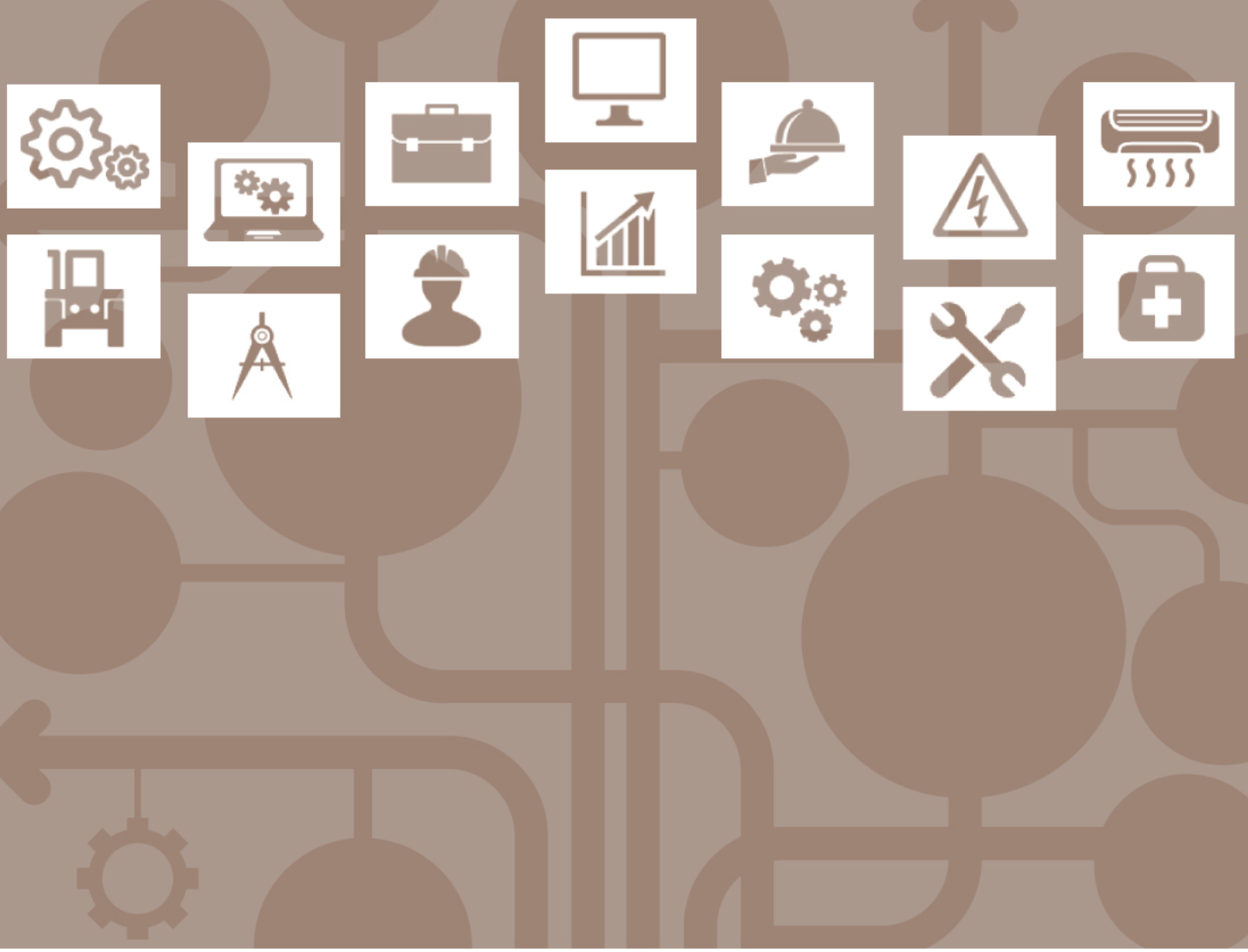
Nocti Business Solutions®
Your Corporate Assessment Provider
www.noctibusiness.com

Entry Level Assessment Blueprint

HVACR Service and Repair



Test Code: 2110 / 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 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
- Troubleshoot, service, and repair various electrical circuits and components (thermostats, transformers, fuses, relays, etc.)
- Troubleshoot, service, and repair various motors and motor controls, including circuit protectors

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 pipe and tubing types and fittings

Specific Competencies and Skills continued:

Airflow and Ductwork

- Maintain appropriate indoor air quality equipment (air cleaners, humidification, etc.)
- Measure temperature change, calculate CFM, and perform other system operation measurements

Warm Air Systems

- Demonstrate knowledge and understanding of sequence of operation
- Properly set up and adjust warm air equipment
- Install and size flues properly, adhering to appropriate gas codes
- Perform preventive maintenance procedures, including combustion analysis and efficiency calculating

Hydronic Systems

- Service and repair hydronic systems and components, including zone valves
- Troubleshoot hydronic operating pressures, water flow, and temperatures

Air Conditioning - Residential

- Identify refrigerants by pressure/temperature relationship and select appropriate refrigerants and oils
- Troubleshoot system components and metering devices
- Understand how to recover, pressure-test, evacuate, and charge an air conditioning system, according to the EPA 608 Clean Air Act

Heat Pumps, Electric Heat

- Troubleshoot and test proper heat pump operation, including reversing valve, defrost controls, and various component functions
- Troubleshoot auxiliary/emergency heat, including outdoor thermostats
- Perform appropriate preventive maintenance procedures, including calculating system efficiency

Specific Competencies and Skills continued:

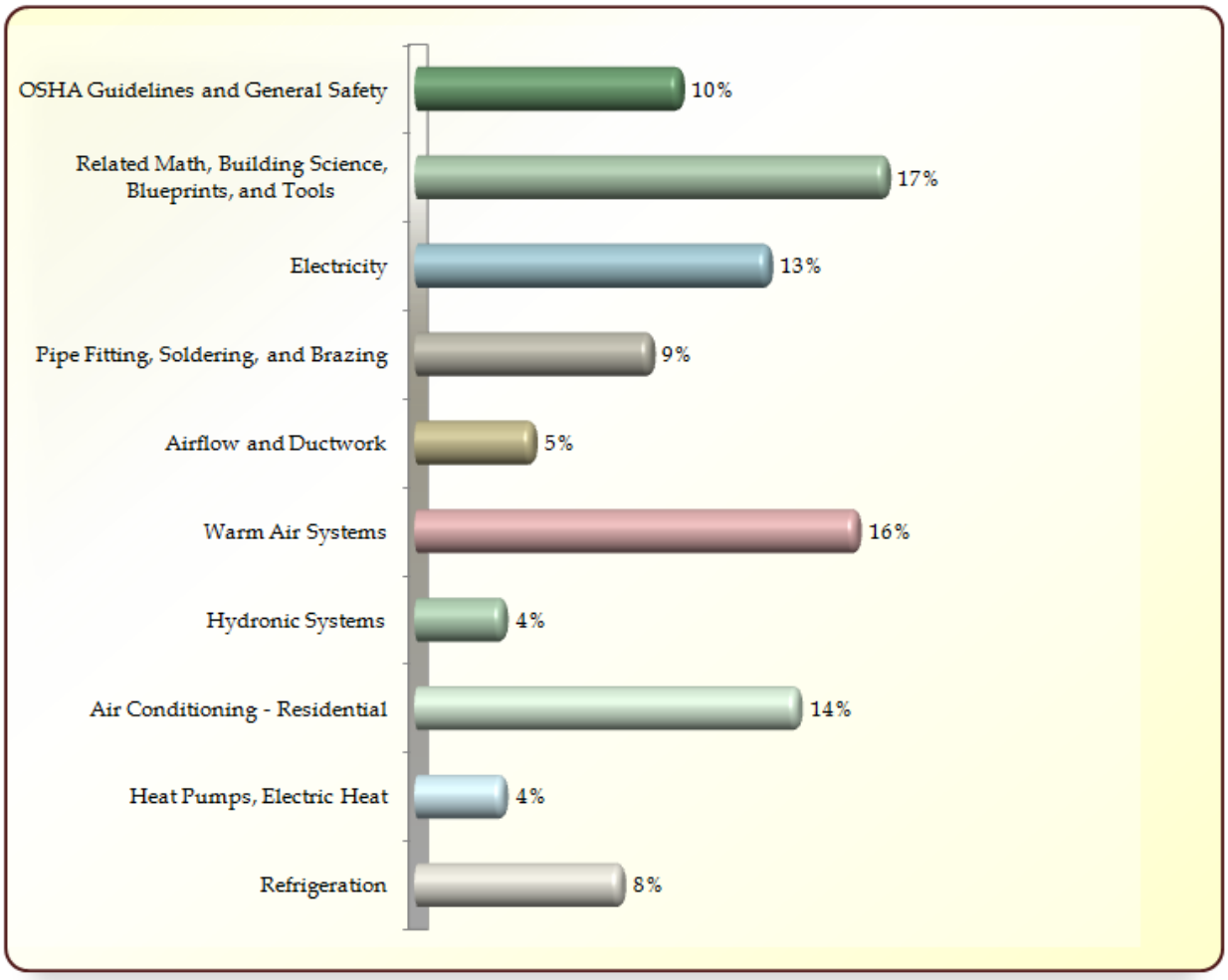
Refrigeration

- Troubleshoot refrigerant components using appropriate testing procedures
- Describe various refrigeration system types and operations
- Service and repair defrost system controls and components

Written Assessment:

Administration Time: 3 hours
Number of Questions: 138

Areas Covered:



Sample Questions:

Natural gas has
A. an odor added to it, to make it detectable
B. a natural odor of its own
C. no chance of leaking into a boiler room
D. a sweet, pleasant odor

Measure relative humidity with a
A. barometer
B. hydrometer
C. psychrometer
D. relativometer

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 using oxyacetylene equipment, the operator should
A. transport uncapped tanks
B. secure the tanks
C. avoid flashback arrestors
D. oil the regulator

Water velocities in hydronic systems are measured in
A. feet per second
B. rotations per minute
D. gallons per hour
D. foot pounds

Performance Assessment:

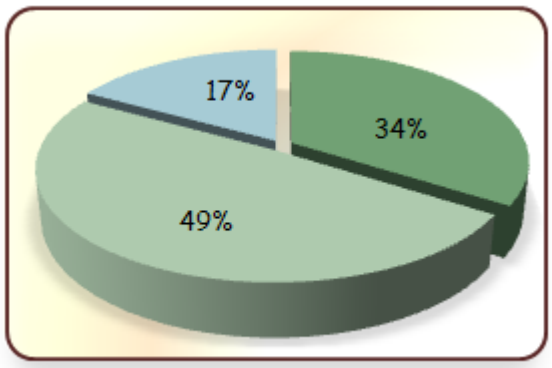
Administration Time: 3 hours
Number of Jobs: 3

Areas Covered:

34% **Troubleshoot and Repair Heat Pump**
Adjust/install manifold gauges, check operation and pressure, start unit, record measurements, problem identification, explain correction procedure, problem correction, and time to complete Job 1.

49% **Pump Down Refrigeration System and Replace Liquid Line Filter Drier**
Install refrigeration gauge manifold set, start system and allow system to stabilize, front-seat liquid line (King) valve, monitor both suction and discharge pressures, stop compressor, relieve (purge) remaining low-side pressure, disconnect and remove liquid line filter/drier, replace liquid line filter/drier, evacuate isolated portion of system to atmosphere, return system to full operation, purge de minimis amount of refrigerant, restart system, record readings, clean-up, and time to complete Job 2.

17% **Locate an AC/R System Leak**
Attach gauges to system, locate leak, demonstrate refrigerant recovery method, record readings, and time to complete Job 3.



Sample Job: Locate an AC/R System Leak

Maximum Time: 45 minutes

Participant Activity: The participant will attach gauges to system using the De minimis Rule, locate leak using provided leak detector tool, and demonstrate proper refrigerant recovery method.