CaliforniaCerts

C-20 HVAC Contractor

Practice test

April 1, 2026
Time limit: 210 minutes

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Answer key for this session (PDF):
californiacerts.com/resources/pdfs/ca-c20-hvac-contractor/ca-c20-hvac-contractor-practice-solution.pdf

1. Which type of duct joint sealant is approved for use on HVAC duct systems per California Mechanical Code?

A. Silicone caulk
B. Spray foam insulation
C. UL 181A or UL 181B listed mastic or foil tape
D. Cloth duct tape

2. When working with R-410A refrigerant, which PPE must be worn?

A. Safety glasses and insulated gloves to protect against refrigerant burns
B. No PPE required for small cylinders
C. Hearing protection only
D. Full face shield and fire-resistant clothing only

3. An air handler blower motor is drawing excessive amperage. The most likely cause is:

A. Low voltage supply to the motor
B. Incorrect belt tension on a belt-drive motor
C. Failing motor bearing, dirty blower wheel, or shorted motor winding
D. The motor is too small for the system

4. Manual D is the ACCA reference used for designing which component of an HVAC system?

A. Equipment selection
B. Residential duct system design
C. Psychrometric analysis
D. Load calculations

5. SMACNA standards govern the fabrication of which HVAC components?

A. Refrigerant handling procedures
B. Electrical wiring of HVAC equipment
C. Fabrication, installation, and testing of sheet metal duct systems
D. Equipment efficiency testing standards

6. An evaporator coil is freezing up during normal operation. The most likely causes include:

A. Dirty filter, low refrigerant charge, or low ambient temperatures
B. Oversized system running continuously
C. High outdoor temperature
D. High indoor humidity only

7. California Title 24 energy standards require HVAC systems to meet minimum efficiency ratings. What does SEER2 measure?

A. Energy factor of gas furnaces
B. Static pressure ratio of duct systems
C. Cooling efficiency of A/C and heat pumps over a typical cooling season
D. Heating efficiency over a season

8. What is the correct sequence for commissioning a newly installed split system air conditioner?

A. Verify charge and pressures, electrical amperage, airflow, temperatures, and document all readings
B. Turn on the system and leave if no error codes appear
C. Set the thermostat and leave the customer a manual
D. Check refrigerant charge only and sign off

9. An older R-22 system requires refrigerant but R-22 is being phased out. Per EPA regulations, a technician may:

A. Convert the system to R-410A without any modifications
B. Use only reclaimed or recycled R-22 to service existing systems
C. Vent the remaining R-22 and use a different refrigerant
D. Purchase new R-22 from manufacturers

10. The electrical supply for a 240V split system air conditioner must be a dedicated circuit. The wire size is determined by:

A. 125% of the equipment's rated load current (MCA on nameplate)
B. The longest possible wire run
C. The circuit breaker size only
D. The contractor's preference

11. A takeoff sheet in HVAC estimating is used to:

A. List all materials and quantities required from reading the construction plans
B. List the HVAC equipment manufacturer warranties
C. Document actual installed quantities after job completion
D. Record customer complaints during the project

12. California Title 24 requires new duct systems and replacement systems to pass a duct leakage test. The maximum allowable duct leakage for new systems is:

A. 15% of system airflow
B. 25% of system airflow
C. No leakage limit for new systems
D. 5% of system airflow

13. Per Cal/OSHA, a ladder must extend at least how many feet above the roofline when used for roof access?

A. 6 feet
B. 3 feet
C. 1 foot
D. 5 feet

14. A gas furnace blower runs but no heat is produced. The inducer motor is running and ignition is attempted but no flame is established. The most likely cause is:

A. Failed inducer motor
B. Cracked heat exchanger
C. Incorrect thermostat wiring
D. Failed igniter, no gas supply, or gas valve not opening

15. A heat pump reversing valve is energized in which mode on most residential systems?

A. Both modes simultaneously
B. Neither mode — it is always de-energized
C. Heating mode
D. Cooling mode

16. What gauge sheet metal is typically used for low-pressure residential duct systems?

A. 30-gauge
B. 20-gauge
C. 14-gauge
D. 26-gauge galvanized steel

17. When installing a gas furnace, the supply air temperature rise must be within the manufacturer's specified range. Excessive temperature rise indicates:

A. The furnace is oversized for the space
B. Insufficient airflow through the heat exchanger causing overheating
C. The gas pressure is too low
D. The thermostat is set too high

18. What is the purpose of a TXV (thermostatic expansion valve) in a refrigeration system?

A. Meter liquid refrigerant into the evaporator maintaining constant superheat
B. Remove moisture from the refrigerant circuit
C. Measure suction pressure at the compressor inlet
D. Compress refrigerant in the condenser

19. An HVAC system has adequate airflow and refrigerant charge but the customer complains of high humidity in the structure. The most likely cause is:

A. The TXV is stuck open
B. Oversized system short-cycles and does not run long enough to remove latent heat
C. The evaporator coil is undersized
D. The condenser coil is dirty

20. A contractor is estimating a commercial HVAC job. The equipment cost is $42,000 and labor is estimated at $18,000. If overhead is 15% and profit is 10% of total costs, what is the bid price?

A. $72,000
B. $75,900
C. $69,000
D. $78,000

21. A zoning system with multiple dampers causes excessive noise from one zone when others are closed. The most likely cause is:

A. The return duct is oversized
B. All airflow forced through open zone increases velocity — bypass damper or variable-speed unit needed
C. The air handler is too small
D. The thermostat is wired incorrectly

22. During preventive maintenance on a split system, which of the following tasks should always be performed?

A. Replace the compressor annually
B. Clean condenser coil, check pressures and temps, inspect electrical, clean filter, check condensate drain
C. Only check refrigerant pressures
D. Only add refrigerant and replace filters

23. When installing a gas furnace, the flue vent pipe must slope toward the furnace at a minimum grade of:

A. 1/4 inch per foot sloping upward toward the chimney
B. 2 inches per foot upward
C. 1 inch per foot downward toward the furnace
D. Level — no slope required

24. The California Mechanical Code requires that flexible duct connectors used to connect equipment to the duct system must not exceed what maximum length?

A. 6 inches
B. No limit specified
C. 14 inches
D. 36 inches

25. The subcooling method for checking refrigerant charge is most reliable for systems with:

A. All systems equally
B. Fixed orifice (piston) systems
C. Systems with TXVs (thermostatic expansion valves)
D. Systems with capillary tubes only

26. What is the minimum clearance required between a condensing unit and a solid fence or wall per standard installation practice?

A. 6 inches on all sides
B. 24 inches on discharge side, 12 inches on inlet sides
C. 48 inches on all sides
D. No clearance required if the unit is a mini-split

27. A dual-run capacitor failure on an air conditioning condensing unit most commonly causes:

A. Compressor or fan motor fails to start or draws high amperage
B. The TXV loses superheat control
C. The condenser fan blows too much air
D. Refrigerant migrates to the compressor

28. A gas furnace ignites but immediately shuts off on the first call for heat. The most likely cause is:

A. Dirty or failed flame sensor
B. Failed inducer motor
C. Incorrect thermostat setting
D. Cracked heat exchanger

29. A technician measures 20°F of superheat at the evaporator outlet of an R-410A system. This indicates:

A. Overcharge — liquid flooding the compressor
B. Normal — evaporator is fully active and compressor is protected
C. Severe undercharge requiring refrigerant
D. TXV is stuck closed

30. Under EPA Section 608, technicians who purchase refrigerants in containers larger than 2 pounds must be:

A. Be certified by an EPA-approved organization
B. Complete 40 hours of safety training
C. Hold a contractor's license only
D. Anyone can purchase refrigerant in any quantity

31. The California Mechanical Code requires HVAC systems to be sized based on which load calculation method?

A. The contractor's experience and judgment
B. The same equipment size as the previous system
C. An approved heat loss/heat gain calculation per Manual J or equivalent
D. Rule-of-thumb sizing based on square footage

32. A split system condenser fan motor is running but the compressor is not. The technician measures voltage at the compressor contactor. What should be checked next?

A. Replace the contactor immediately
B. Check the run capacitor and internal overload protector
C. Replace the thermostat
D. Add refrigerant to the system

33. A condensate overflow switch (float switch) is installed to:

A. Measure condensate flow rate
B. Regulate refrigerant flow
C. Filter condensate before it drains
D. Shut off the system when the condensate drain pan fills due to a clogged drain

34. A system has low suction pressure and low head pressure. The most likely cause is:

A. Low refrigerant charge (undercharge)
B. Failed compressor valves
C. Dirty condenser coil
D. Overcharge of refrigerant

35. Proper electrical safety when working on HVAC equipment requires testing for voltage with a multimeter before touching wires. This is done to:

A. Verify circuits are de-energized with a multimeter — capacitors can store lethal charge
B. Assume circuits are de-energized if the disconnect is open
C. Test only after all power to the building is disconnected
D. Use rubber gloves only, no testing needed

36. When using a brazing torch near combustible materials, which precaution is required?

A. Turn off the gas supply to the building
B. Maintain a fire watch during and for 30 min after brazing with a fire extinguisher available
C. No special precautions needed for torch work
D. Only use fire watch for outdoor brazing

37. Manual S is used in HVAC system design to:

A. Analyze psychrometric properties of air
B. Calculate commercial loads
C. Select equipment whose performance matches Manual J design loads
D. Design duct systems

38. Before entering a confined space such as a mechanical room or crawl space, a technician must:

A. Test for oxygen level, flammable gases, and toxic contaminants before entry
B. Enter and ventilate the space while working
C. Have a coworker wait outside and enter immediately
D. No special procedures required for crawl spaces

39. A cooling load calculation must account for heat gain from which of the following sources?

A. Duct leakage only
B. Outdoor temperature only
C. Refrigerant charge only
D. Solar gain, conduction, internal gains, and infiltration

40. When estimating a duct system, the equivalent length method accounts for:

A. Converts fittings into equivalent lengths of straight duct based on pressure drop
B. Determines duct insulation requirements
C. Measures actual duct length only
D. Calculates airflow velocity

41. Under CSLB regulations, a C-20 contractor must not perform work that exceeds the scope of their license. Work that exceeds $500 in combined labor and materials and is outside the HVAC scope requires:

A. A general contractor to oversee the work
B. Permission from the property owner
C. A separate license classification for the out-of-scope work
D. A C-20 can perform any construction work

42. Cal/OSHA requires fall protection for workers on roofs at heights of:

A. 6 feet
B. 4 feet
C. 10 feet
D. 7.5 feet

43. What is the design dry-bulb temperature used in load calculations?

A. The temperature exceeded only 1–2.5% of the time during peak season
B. The average annual high temperature
C. The highest temperature ever recorded at the location
D. The minimum outdoor temperature for winter design

44. A heat pump has a COP of 3.5 in heating mode. This means:

A. The system efficiency is 35%
B. The heat pump requires 3.5 tons of capacity
C. The heat pump uses 3.5 times more electricity than a resistance heater
D. The heat pump delivers 3.5 units of heat for every 1 unit of electricity consumed

45. An HVAC system installed in California must comply with which code for mechanical equipment?

A. ASHRAE Standard 90.1 only
B. SMACNA standards only
C. The California Mechanical Code (Title 24, Part 4)
D. International Mechanical Code without amendments

46. A refrigerant system must be pressure tested before charging with refrigerant. What gas is used for leak testing?

A. Carbon dioxide
B. Dry nitrogen
C. Oxygen
D. Compressed air

47. What is the OSHA permissible exposure limit (PEL) for carbon monoxide in the workplace?

A. 5 ppm
B. 50 ppm as an 8-hour time-weighted average
C. 200 ppm
D. 500 ppm

48. What symptom indicates that a TXV is stuck closed?

A. Normal pressures with no superheat
B. High suction pressure and low superheat
C. High suction and high head pressure
D. Very low suction pressure and extreme superheat

49. Zoning systems in residential HVAC use which primary control mechanism?

A. Separate gas valves for each zone
B. Motorized dampers controlled by individual zone thermostats
C. Multiple air handlers with separate refrigerant circuits
D. A central thermostat controlling all zones simultaneously

50. When sizing a residential gas furnace, the output BTU/h capacity should be:

A. Be selected based on the previous equipment size
B. Exactly match the calculated load
C. Not exceed 125–140% of the calculated design heating load
D. Be at least 200% of the calculated load for safety

51. What is the purpose of a filter dryer in a refrigerant circuit?

A. Measure system superheat
B. Prevent refrigerant migration during off cycles
C. Regulate refrigerant flow to the evaporator
D. Remove moisture and contaminants from the refrigerant circuit

52. To measure the refrigerant charge using the superheat method, a technician needs:

A. Ambient temperature and thermostat setting
B. Only suction line temperature
C. Suction line temperature and suction pressure (to find saturation temperature)
D. Discharge pressure and liquid line temperature

53. The electrical disconnect for an HVAC unit must be located within sight of the equipment and within how many feet?

A. 50 feet
B. 10 feet
C. 25 feet
D. 100 feet

54. California's Title 24 Building Energy Efficiency Standards primarily affect HVAC contractors by requiring:

A. Minimum efficiency ratings, duct sealing/insulation, and commissioning documentation
B. Only choosing aesthetically pleasing equipment
C. Filing paperwork with the state after installation
D. Using only California-manufactured equipment

55. An air conditioning system has high suction pressure and high head pressure. Both pressures are elevated. The most likely cause is:

A. Overcharge — too much refrigerant
B. Low refrigerant charge
C. Failed condenser fan motor
D. Dirty evaporator coil

56. What is the primary purpose of a psychrometric chart in HVAC system design?

A. Calculate refrigerant charge
B. Determine duct sizing
C. Measure static pressure in duct systems
D. Graphically represent the properties of moist air

57. A contractor on a job site discovers that an employee has symptoms of heat stroke. The correct immediate action is:

A. Wait to see if symptoms improve before calling for help
B. Have the victim walk to the emergency room
C. Move to cool area, apply ice packs to neck/armpits/groin, and call 911 immediately
D. Give the victim a cold drink and have them rest for 10 minutes

58. An air conditioner has 2,400 watts of electrical input and 24,000 BTU/h of cooling. What is the EER of this system?

A. 2.4
B. 10.0
C. 9.0
D. 12.0

59. A refrigerant recovery machine must be used before opening any refrigerant circuit. This is required by:

A. EPA Section 608 of the Clean Air Act
B. Local fire department regulations
C. Cal/OSHA Title 8
D. ASHRAE Standard 15

60. What refrigerant is required for new residential air conditioning equipment as of January 1, 2025 per California regulations?

A. R-407C
B. R-32 and R-454B (lower GWP alternatives)
C. R-22
D. R-134a

61. When working in an attic during summer in California, heat illness prevention requires:

A. Have employees drink only sports drinks
B. Work only in the early morning hours
C. No special precautions needed for short-duration attic work
D. Provide water, shade, and rest periods per Cal/OSHA regulations

62. In duct design, the "available static pressure" for the duct system is calculated as:

A. Fan motor horsepower divided by airflow
B. Total external static pressure plus component drops
C. Total external static pressure minus the pressure drop of all components
D. Supply pressure minus return pressure

63. When installing a split system, the lineset should be run with the suction line:

A. On the bottom, insulated separately, with the liquid line on top
B. Buried underground for protection
C. Bundled together with the liquid line, no insulation needed
D. On top, with the liquid line below

64. When handling liquid R-410A from a cylinder, the risk of freeze burns is because:

A. R-410A is too warm to cause burns
B. Liquid refrigerant only causes irritation, not burns
C. Liquid R-410A rapidly freezes (cryogenic burn) exposed skin at its -61°F boiling point
D. R-410A causes chemical burns not freeze burns

65. A furnace heat exchanger must be inspected before startup to check for:

A. Increased gas consumption only
B. Reduced heating capacity only
C. Furnace short-cycling
D. Carbon monoxide mixing with supply air — a life-safety hazard

66. What is the purpose of a condensate trap on a forced-air cooling system?

A. Prevent negative pressure from siphoning air through the condensate drain
B. Filter drain water from the condensate pan
C. Reduce vibration in the condensate drain line
D. Collect refrigerant that leaks from the evaporator coil

67. A heat pump in heating mode is not achieving adequate capacity. The outdoor coil is covered with a heavy layer of ice. The most likely cause is:

A. Thermostat set too low
B. Low refrigerant charge
C. Defrost control failure
D. Outdoor temperature too high

68. The suction line of a split air conditioning system should be sized to:

A. Be as small as possible to increase velocity
B. Match the liquid line diameter exactly
C. Be sized for the total system BTU only
D. Minimize pressure drop while maintaining sufficient velocity for oil return

69. What is "acid burnout" in a refrigerant compressor?

A. Refrigerant reacting with copper tubing
B. Overheating of the compressor discharge
C. Moisture reacting with refrigerant and oil to form acids that damage compressor windings
D. Excessive voltage burning out motor windings

70. A change order in HVAC contracting is used when:

A. Document changes to the original scope, price, and schedule before work begins
B. Inform the customer of project progress
C. Record warranty information for installed equipment
D. Order additional materials from suppliers

71. Lockout/tagout (LOTO) procedures are required before:

A. After completing all work on the system
B. Before any servicing where unexpected energization could cause injury
C. Only when working on gas appliances
D. Only for systems over 480V

72. What reading on a combustion analyzer indicates incomplete combustion in a gas furnace?

A. Complete and efficient combustion
B. Normal combustion readings within spec
C. Incomplete combustion — insufficient air, cracked exchanger, or improper gas pressure
D. The furnace is operating at peak efficiency

73. Under Cal/OSHA, an employer must provide a written Injury and Illness Prevention Program (IIPP) that includes:

A. Hazard identification and correction, employee communication, training, and recordkeeping
B. A form filed annually with Cal/OSHA
C. Equipment inspection logs only
D. Insurance policy requirements

74. CFM (cubic feet per minute) in duct design is primarily determined by:

A. Fan motor horsepower
B. Duct size alone
C. The heating or cooling load of the room being served
D. The number of occupants in the room

75. The grains of moisture per pound of dry air is a measure of:

A. Wet-bulb temperature
B. Absolute moisture content (humidity ratio)
C. Dew point temperature
D. Relative humidity

76. During startup of a new air conditioning system, a technician measures subcooling at the condenser outlet. Proper subcooling for most systems is:

A. Subcooling should be zero
B. 30–40°F
C. 0–5°F
D. 10–20°F for most systems

77. A packaged water source heat pump eliminates which component compared to a split system?

A. Evaporator
B. Air-cooled condenser
C. Reversing valve
D. Capacitor

78. Which factor most significantly increases the cooling load in a building with large south-facing windows?

A. North-facing roof color
B. Internal heat from occupants
C. Solar heat gain through south-facing windows
D. Duct leakage from the supply system

79. A thermocouple in a gas furnace is a safety device that:

A. Safety device that controls the thermostat
B. Safety device that confirms the existence of a pilot flame
C. Safety device for electronic ignition
D. Safety control for the fan

80. What type of respirator is required when working in spaces with oxygen-deficient atmospheres due to refrigerant accumulation?

A. A self-contained breathing apparatus (SCBA) or supplied-air respirator
B. A chemical cartridge respirator
C. A standard N95 dust mask
D. No respirator needed if under 30 minutes

81. Hydrofluoric acid can be formed when HFC refrigerants are exposed to:

A. Water or humidity
B. Contact with copper tubing
C. Open flames or very high temperatures
D. Ultraviolet light

82. Return air ducts in a residential HVAC system should be sized to maintain a maximum velocity of approximately:

A. 1,500–2,000 FPM for maximum efficiency
B. As high as possible to move maximum air
C. 100–200 FPM only
D. 600–900 FPM to minimize noise

83. The Global Warming Potential (GWP) of a refrigerant is a concern for California contractors because:

A. High GWP refrigerants are incentivized by the state
B. California CARB regulations target high-GWP refrigerants requiring transition to lower-GWP alternatives
C. GWP only affects residential systems
D. Federal regulations preempt all California GWP rules

84. California requires HVAC installations to be inspected and permitted. Who is responsible for obtaining the permit?

A. The local utility company
B. The equipment manufacturer
C. The licensed contractor
D. The homeowner

85. The minimum slope required for a condensate drain line is:

A. 1 inch per foot
B. 1/8 inch per foot toward the drain
C. 2 inches per foot
D. Level — no slope required

86. What is "latent heat" in the context of air conditioning?

A. Heat energy involved in condensing moisture from air without changing temperature
B. Heat conducted through building walls
C. Heat associated with temperature change
D. Radiant heat gain from sunlight

87. What is the most common cause of compressor failure in residential HVAC systems?

A. Liquid refrigerant or oil entering the compressor
B. Dirty condenser coils
C. Excessive suction pressure
D. Failed contactor

88. The ASHRAE Handbook — Fundamentals is primarily referenced by HVAC contractors for:

A. Refrigerant recovery procedures
B. California licensing requirements
C. Equipment installation procedures
D. Scientific foundation including thermodynamics, psychrometrics, and heat transfer

89. How often should air filters in a residential HVAC system typically be replaced?

A. Every 5 years
B. Once a year
C. Every 1–3 months depending on type and conditions
D. Only when the system stops working

90. Under California law, releasing refrigerant intentionally into the atmosphere is:

A. Illegal — prohibited by EPA Section 608 and California law with fines up to $37,500/day
B. Legal if the system is being decommissioned
C. Legal for small quantities under 5 lbs
D. Legal if the refrigerant is R-22 only

91. Cal/OSHA requires that a safety data sheet (SDS) be available for which materials?

A. Only for materials used outdoors
B. Only for flammable materials
C. Only for refrigerants above 50 lb cylinders
D. All hazardous chemicals including refrigerants, solvents, fluxes, and cleaning chemicals

92. The enthalpy of air at a given condition represents:

A. Only the temperature of the air
B. The static pressure of the air stream
C. Total heat content per pound of dry air — sensible plus latent heat combined
D. The humidity ratio in grains per pound

93. According to Cal/OSHA, roof work requires fall protection when working at heights of:

A. 10 feet
B. 4 feet
C. 7.5 feet
D. 6 feet

94. In a duct system, a plenum is:

A. A type of outdoor condensing unit
B. The air distribution chamber connected to the air handler
C. A type of HVAC filter
D. A chemical used to seal duct joints

95. Refrigerant cylinders must be stored:

A. In enclosed vehicles when not in use
B. Upright, secured, away from heat sources, in ventilated areas
C. On their sides in direct sunlight for accessibility
D. Near the work area for convenience

96. An air conditioning system is running but not cooling. The technician measures normal suction pressure but high head pressure. The most likely cause is:

A. Oversized evaporator coil
B. Low refrigerant charge
C. Dirty condenser coils restricting airflow
D. Stuck-open TXV

97. Electrical panels must remain accessible at all times. The minimum clearance in front of an electrical panel is:

A. 24 inches
B. 12 inches
C. 36 inches (3 feet)
D. No clearance required if door can close

98. What is the design heating load used for in HVAC system sizing?

A. Determine the annual fuel usage of the system
B. Calculate the duct airflow requirements
C. Size the gas supply line to the furnace
D. Determine the minimum heating capacity to maintain comfort during coldest conditions

99. What is the function of a scroll compressor compared to a reciprocating compressor?

A. Quieter, more efficient, and more reliable than reciprocating compressors
B. Used only in commercial systems
C. Requires higher refrigerant charge
D. Less efficient than reciprocating compressors

100. What does the term "sensible heat ratio" (SHR) represent in HVAC design?

A. Total load ÷ equipment capacity
B. Latent load ÷ sensible load
C. Sensible load ÷ total load
D. Cooling capacity ÷ electrical input

101. What is the purpose of a Manual N calculation?

A. Commercial building load calculations
B. Residential duct design
C. Residential equipment selection
D. Psychrometric analysis

102. After installing a new refrigerant system, a vacuum must be pulled to remove moisture and non-condensables. The system should be evacuated to a minimum of:

A. 5,000 microns
B. 1 inch of mercury vacuum
C. 29.9 inches Hg
D. 500 microns or less

103. The refrigerant line set for a split system should be insulated to prevent:

A. Hold the line set in place
B. Prevent condensation and reduce heat gain
C. Protect the line from physical damage
D. Prevent UV degradation of the copper tubing

104. Which ACCA manual is used for residential load calculations?

A. Manual J
B. Manual D
C. Manual N
D. Manual S

105. When troubleshooting a system with a suspected refrigerant leak, an electronic leak detector should be used. The probe should be placed:

A. In the return air stream
B. At the highest point in the room
C. At the lowest point around fittings and coils where vapors accumulate
D. At the suction service valve only

106. What is the purpose of a heat gain calculation for an existing building?

A. Determine actual cooling load to right-size replacement equipment
B. Estimate the age of the existing system
C. Document original installation records
D. Calculate the original equipment warranty period

107. An HVAC technician discovers a refrigerant leak. Under EPA Section 608, what action must be taken?

A. Repair leaks within 30 days if leak rate exceeds applicable threshold
B. Vent the refrigerant and recharge
C. No action is required for leaks under 50 lbs
D. Report the leak to the EPA within 24 hours only

108. A contractor discovers that the actual job cost exceeds the original estimate by 20%. The most likely cause is:

A. Equipment was higher quality than estimated
B. Inaccurate takeoffs, omissions, scope changes not covered by change orders, or unforeseen conditions
C. Labor was more efficient than expected
D. The customer added extra rooms

109. A gas furnace has a cracked heat exchanger. The primary safety concern is:

A. Increased gas consumption only
B. Fan motor overheating
C. Carbon monoxide mixing with supply air — a life-threatening hazard
D. Minor efficiency loss only

110. California requires all HVAC contractors to carry workers' compensation insurance when they:

A. Workers' compensation is optional for contractors
B. Have 10 or more full-time employees
C. Have annual payroll over $500,000
D. Employ one or more workers — even part-time

111. When brazing refrigerant lines, nitrogen should be flowed through the tubing to prevent:

A. The refrigerant from escaping
B. Formation of copper oxide scale inside the tubing
C. The flame from extinguishing
D. Moisture from entering the system

112. Refrigerant cylinders must never be heated with an open flame because:

A. It is only prohibited for R-22 cylinders
B. It would cool the cylinder too quickly
C. It can cause the relief valve to open or cylinder to rupture catastrophically
D. It would contaminate the refrigerant

113. Asphyxiation is a hazard when working in confined spaces with high concentrations of refrigerant because:

A. Refrigerant burns when mixed with air
B. Refrigerants are heavier than air and displace oxygen causing deficiency
C. Refrigerant reacts with oxygen to form toxic compounds
D. Refrigerant is toxic at any concentration

114. A new split system is charged by weight. After charging, the technician verifies correct charge by:

A. Checking system pressures only
B. Just by looking at the sight glass
C. No verification needed after charging by weight
D. Checking superheat and subcooling against manufacturer specifications

115. When installing ductwork in an unconditioned attic, California Title 24 requires duct insulation of at least:

A. R-30
B. R-2
C. R-8
D. R-19