PRACTICE EXAM 16: RACM RED SEAL SIMULATION (125 QUESTIONS)

1. A technician must enter a walk-in cooler to recover refrigerant after a suspected large leak. Before entering, what is the most important safety consideration?

A. Confirm the lockout tag is signed and dated by the previous shift

B. Verify oxygen levels and ventilate the space to prevent asphyxiation

C. Ensure the recovery cylinder is rated for the refrigerant being removed

D. Check that the manifold gauge set has been calibrated within the year

2. A WHMIS 2015 supplier label is missing from a drum of compressor oil in the shop. What is the correct action?

A. Quarantine the drum and obtain a replacement label before any use

B. Apply a workplace label copied from the safety data sheet contents

C. Continue using the oil since the SDS is filed in the binder nearby

D. Transfer the oil to a labelled container and discard the original drum

3. When using an oxy-acetylene torch for brazing, the acetylene working pressure should generally not exceed which value to avoid the risk of explosive decomposition?

A. 5 psig

B. 10 psig

C. 15 psig

D. 30 psig

4. A refrigeration mechanic is planning a lift of a 180 kg condensing unit onto a rooftop curb. Which factor most directly determines the safe working load of the chosen sling?

A. The overall length of the sling between the hook and the load

B. The sling angle and the rated capacity reduction at that angle

C. The colour code stamped on the sling identification tag

D. The ambient temperature at the rooftop work location

5. Which document provides the authoritative hazard and handling information a technician must consult before working with an unfamiliar refrigerant?

A. The equipment installation manual supplied by the manufacturer

B. The provincial apprenticeship training standard for the trade

C. The safety data sheet for that specific refrigerant product

D. The Red Seal Occupational Standard task matrix listing

6. A coworker on a job site is using disrespectful language and refusing to follow the agreed work sequence. What is the most professional first response?

A. Report the behaviour immediately to the provincial regulator

B. Continue the work alone and document the lack of cooperation

C. Refuse to proceed until a supervisor reassigns the coworker

D. Speak with the coworker directly to clarify the work plan

7. A digital micron gauge is used during evacuation. What does this instrument primarily measure?

A. The mass of refrigerant remaining in the low side of the system

B. The deep vacuum level in the system in microns of mercury

C. The superheat at the evaporator outlet during pull-down

D. The electrical resistance of the compressor motor windings

8. Before grinding a piece of steel pipe support, which personal protective equipment combination is most appropriate?

A. Hearing protection and steel-toed boots only

B. A dust mask, gloves, and a high-visibility vest

C. A respirator, coveralls, and chemical-resistant gloves

D. Face shield with safety glasses, gloves, and hearing protection

9. A technician is asked to mentor a first-year apprentice on tubing flares. What is the most effective mentoring approach?

A. Provide a written procedure and let the apprentice work unobserved

B. Demonstrate the task, then supervise the apprentice performing it

C. Complete the flares quickly so the schedule is not delayed

D. Have the apprentice watch a video before attempting the task

10. Which tool is specifically designed to produce a clean, square cut on soft copper tubing without deforming the end?

A. A fine-tooth hacksaw with a vise

B. A reciprocating saw with a metal blade

C. A tubing cutter with a sharp cutting wheel

D. An abrasive cut-off wheel on a grinder

11. A job hazard assessment is required before starting work in an occupied commercial kitchen. What is the primary purpose of this assessment?

A. To document labour hours for the customer invoice

B. To select the correct refrigerant for the system

C. To satisfy the manufacturer's warranty requirements

D. To identify hazards and control measures before work begins

12. When organizing a service call, which step should be completed first to ensure efficient work?

A. Review the work order and confirm required parts and tools

B. Recover all refrigerant from the affected system immediately

C. Replace the suspected faulty component without testing

D. Submit the completed invoice to the office for processing

13. A pressurized nitrogen cylinder is being moved across a mechanical room. What is the correct handling practice?

A. Lay the cylinder horizontally on a flat cart for stability

B. Remove the protective cap to check the valve before moving

C. Roll the cylinder on its base edge across the floor quickly

D. Secure the cap in place and use a cylinder cart, chained upright

14. A technician is preparing a work site in a finished basement before installing a ductless mini-split. Which preparation step protects the customer's property best?

A. Open all windows to ventilate the brazing fumes outdoors

B. Run the condensate line before mounting the indoor head

C. Test the breaker panel capacity for the new circuit load

D. Lay protective coverings over flooring and furnishings nearby

15. When silver brazing a copper-to-copper joint, why is dry nitrogen purged through the tubing during the process?

A. To increase the working pressure inside the joint area

B. To prevent the formation of copper oxide scale internally

C. To cool the joint rapidly and speed up the brazing cycle

D. To test the joint for leaks immediately after brazing

16. A copper joint shows a rough, grainy surface and incomplete filler penetration after brazing. What is the most likely cause?

A. The nitrogen flow rate was set too high during brazing

B. The filler rod had too high a silver content for the joint

C. Insufficient heat or overheating caused poor capillary flow

D. The flux was applied too thinly across the joint surface

17. What is the primary reason for reaming the inside of a freshly cut copper tube before assembly?

A. To increase the outside diameter for a tighter fit

B. To remove the burr that would restrict flow and cause turbulence

C. To clean the outer surface for better flux adhesion

D. To work-harden the tube end before flaring it

18. A technician must fabricate a 90-degree bend in soft copper tubing without kinking. Which method is correct?

A. Heat the tube with a torch and bend it freehand quickly

B. Make several short cuts and braze elbow fittings together

C. Clamp the tube in a vise and bend it over a sharp edge

D. Use a spring bender or lever-type tube bender sized to the tube

19. During flaring of refrigeration tubing, the flare appears cracked and uneven. What is the most likely cause?

A. The flaring block was lubricated with refrigeration oil

B. The tube was cut with a sharp tubing cutter wheel

C. The tube was annealed before the flare was made

D. The tube was over-flared or the end was not deburred

20. Which type of solder joint is generally NOT acceptable on the high-pressure liquid line of a refrigeration system?

A. A soft-soldered joint using 50/50 tin-lead solder

B. A silver-brazed joint with 15% silver filler rod

C. A brazed joint using a phosphorus-copper filler

D. A swaged and brazed copper-to-copper connection

21. A pressure test of a newly piped system is required. Which gas is most appropriate and why?

A. Oxygen, because it is readily available and inexpensive

B. The system refrigerant, because it confirms operating pressure

C. Dry nitrogen, because it is inert and will not react with oil

D. Compressed shop air, because it contains moisture for testing

22. When swaging copper tubing to join two equal-diameter tubes, the depth of the swage should be approximately equal to what?

A. Half the tube diameter

B. One tube diameter

C. Two tube diameters

D. The wall thickness only

23. A technician notices excessive flux residue remaining inside a refrigeration line after brazing a fitting. Why is this a concern?

A. It improves the corrosion resistance of the joint

B. It can react with refrigerant and oil, causing system contamination

C. It increases the strength of the brazed connection

D. It prevents future leaks by sealing micro-cracks

24. What is the main advantage of using a phos-copper (BCuP) filler rod when joining copper to copper?

A. It requires a higher brazing temperature for strength

B. It is suitable for joining copper to steel directly

C. It produces the strongest joint of any filler available

D. It is self-fluxing on copper, so no separate flux is needed

25. A routine task requires cutting and threading a section of black iron pipe for a gas line. Which compound is applied to the threads?

A. Refrigeration oil mixed with PTFE powder

B. An approved pipe-thread sealant rated for the gas service

C. Silver brazing flux applied to the male threads

D. Anti-seize compound rated only for high temperature

26. Why should a technician avoid using an oversized torch tip when brazing small-diameter tubing?

A. It uses less fuel gas and slows the brazing process

B. It can overheat the joint and burn out the flux prematurely

C. It produces a carburizing flame that strengthens the joint

D. It reduces the chance of copper oxide forming internally

27. During work-site preparation for a rooftop unit replacement, what should be verified about the existing curb?

A. The colour of the curb matches the new unit cabinet

B. The curb was painted within the last twelve months

C. The curb dimensions and gasket match the new unit footprint

D. The curb is filled with insulation to reduce noise transfer

28. A technician must isolate a section of an operating system to perform a brazing repair. What is the correct sequence?

A. Braze first, then recover refrigerant from the open section

B. Open the section to atmosphere, then pump down afterward

C. Recover or isolate refrigerant, then purge with nitrogen before brazing

D. Pressurize the section with refrigerant during the brazing repair

29. When fabricating a condensate drain line, what minimum slope is generally recommended to ensure proper gravity drainage?

A. About 1% slope, roughly 1/8 inch per foot of run

B. About 5% slope, roughly 5/8 inch per foot of run

C. A level run with no slope to avoid air locks

D. A reverse slope back toward the evaporator pan

30. Why is a sediment trap (drip leg) installed near a gas-fired appliance connection?

A. To regulate the gas pressure to the burner manifold

B. To capture debris and condensate before reaching the valve

C. To increase the gas flow rate to the appliance

D. To act as the primary shutoff for the appliance

31. A technician needs to support horizontal copper refrigerant lines along a wall. What is the primary concern when selecting hanger spacing?

A. Maximizing the distance between hangers to save material

B. Matching the hanger colour to the building interior finish

C. Ensuring hangers are made of the same metal as the pipe

D. Preventing sag and stress while allowing for thermal movement

32. Galvanic corrosion is a risk when copper tubing contacts which material directly?

A. A dissimilar metal such as a steel hanger without isolation

B. Closed-cell foam pipe insulation rated for the service

C. Another copper fitting brazed at the same joint

D. A plastic isolation clip designed for the tubing

33. When sizing a suction line for a low-temperature refrigeration system, what is the primary design goal regarding refrigerant velocity?

A. Maintain adequate velocity to carry oil back to the compressor

B. Minimize velocity to reduce noise in occupied spaces

C. Maximize velocity to increase the system cooling capacity

D. Keep velocity constant regardless of vertical rise in the line

34. A psychrometric chart shows entering air at 27°C dry bulb and 19°C wet bulb. The dew point is read where?

A. At the intersection of dry bulb and relative humidity lines

B. At the top scale where enthalpy lines terminate

C. Where the wet-bulb line meets the saturation curve

D. At the vertical right edge of the chart grid

35. When planning a refrigerant piping layout, why is a P-trap installed at the bottom of a long suction riser?

A. To collect oil and assist its return up the riser in slugs

B. To drain condensate from the inside of the suction line

C. To reduce the refrigerant charge needed for the riser

D. To act as a vibration isolator at the compressor inlet

36. A heat load calculation for a cold-storage room must account for which heat source unique to such a space?

A. Solar gain through large south-facing glass windows

B. Lighting heat from incandescent fixtures only

C. Product respiration and infiltration through door openings

D. Heat rejected from rooftop condensing units nearby

37. When selecting a thermostatic expansion valve (TXV), the valve's rated capacity must be matched to what?

A. The evaporator load and the design pressure drop across it

B. The colour code of the suction line insulation

C. The length of the liquid line from the receiver

D. The voltage supplied to the system control circuit

38. A technician is planning the location of a condensing unit. Which factor is most important for proper condenser operation?

A. Proximity to the building electrical service panel

B. Adequate clearance for airflow and heat rejection

C. The aesthetic appearance from the street view

D. The shortest possible condensate drain routing

39. In planning a control system, what is the function of an interlock between a supply fan and a cooling stage?

A. To increase the cooling capacity during peak demand

B. To reverse the refrigerant flow during defrost cycles

C. To prevent cooling from operating unless airflow is proven

D. To bypass the thermostat during occupied periods

40. When planning the installation of a low-voltage control circuit, which conductor type is typically specified for thermostat wiring?

A. Single-conductor armoured cable rated for line voltage

B. High-temperature mineral-insulated heating cable

C. Multi-conductor low-voltage thermostat cable, color-coded

D. Bare solid copper grounding conductor only

41. A liquid line must rise vertically to a higher floor. What design concern does this vertical lift introduce?

A. The liquid will flash to vapour due to gravity assistance

B. Pressure drop from the lift can cause flash gas at the TXV

C. The line will require a larger diameter than the suction line

D. Oil will accumulate at the top of the liquid riser

42. When planning duct sizing for an air-handling system, increasing duct size while maintaining airflow will do what to static pressure loss?

A. Decrease the friction loss and lower the static pressure

B. Increase the air velocity and raise the static pressure

C. Have no effect on static pressure in the duct system

D. Cause the airflow to reverse direction in the branch

43. A control system design calls for a normally closed (N.C.) high-pressure cutout. How does it function?

A. It closes the circuit only when high pressure is reached

B. It remains open during normal operation and closes on fault

C. It opens the circuit when pressure rises above the setpoint

D. It modulates the compressor speed proportionally to pressure

44. When planning a refrigerant selection for a new medium-temperature system, which environmental property is now a primary regulatory consideration?

A. The boiling point of the refrigerant at standard pressure

B. The global warming potential (GWP) of the refrigerant

C. The colour of the refrigerant in the liquid phase

D. The viscosity of the refrigerant at operating temperature

45. A technician plans an evacuation procedure for a large system. Why might a vacuum decay test be specified after evacuation?

A. To confirm the system holds vacuum, proving no leaks or moisture

B. To measure the superheat at the evaporator under vacuum

C. To verify the refrigerant charge weight before startup

D. To check the oil level in the compressor crankcase

46. In planning an installation, the equivalent length of a piping run includes what in addition to straight pipe?

A. The added friction loss from fittings, valves, and bends

B. The vertical height of the building only

C. The total weight of the refrigerant charge

D. The ambient temperature surrounding the pipe

47. When sizing an electrical disconnect for a condensing unit, which nameplate value is the primary basis?

A. The unit's net refrigeration capacity in tons

B. The refrigerant type and total charge weight

C. The minimum circuit ampacity and maximum fuse size

D. The physical dimensions of the unit cabinet

48. A control plan requires a time-delay relay on a compressor circuit. What is its primary protective purpose?

A. To increase compressor starting torque on demand

B. To bypass the low-pressure control during startup

C. To prevent rapid short-cycling of the compressor

D. To reduce the voltage supplied to the motor windings

49. When planning insulation for a chilled-water or suction line, what is the main reason a continuous vapour barrier is required?

A. To increase the structural support of the pipe run

B. To improve the appearance of the finished installation

C. To allow easy access for future leak inspection

D. To prevent moisture migration and condensation within the insulation

50. A planned system uses a receiver after the condenser. What is the primary function of the receiver?

A. To superheat the refrigerant vapour before the compressor

B. To store liquid refrigerant and accommodate charge variations

C. To remove non-condensable gases from the high side

D. To meter refrigerant flow into the evaporator coil

51. A technician is installing a TXV with an external equalizer. Where must the external equalizer line connect?

A. To the suction line just downstream of the TXV bulb

B. To the liquid line ahead of the expansion valve inlet

C. To the discharge line at the compressor outlet

D. To the receiver outlet on the high-pressure side

52. When mounting a TXV sensing bulb on a horizontal suction line, where should it be clamped for the most accurate reading?

A. On the very bottom of the line at the 6 o'clock position

B. Loosely wrapped with tape only, not clamped tightly

C. On a vertical section just before the compressor inlet

D. On the upper side of the line, typically the 10 or 2 o'clock position

53. During installation, a condensing unit is set on vibration isolators. What problem are these primarily designed to prevent?

A. Refrigerant leakage from the service valves

B. Electrical arcing in the contactor terminals

C. Transmission of vibration and noise to the structure

D. Overheating of the compressor crankcase

54. A split system requires a long line set between the indoor and outdoor units. What must be done to the field-charge amount?

A. Add refrigerant per the manufacturer's chart for line-set length

B. Reduce the factory charge to compensate for the extra tubing

C. Leave the factory charge unchanged regardless of length

D. Replace the refrigerant with a higher-pressure type

55. When installing electrical conductors to a rooftop unit, why must the wiring be protected where it passes through a metal cabinet panel?

A. To improve the conductor's current-carrying capacity

B. To prevent abrasion of the insulation by the sharp edge

C. To reduce the voltage drop along the conductor length

D. To shield the wiring from refrigerant exposure

56. A technician installs a liquid-line filter drier. In which orientation and location is it correctly placed?

A. In the liquid line with the arrow pointing toward the metering device

B. In the suction line with the arrow toward the compressor

C. In the discharge line with the arrow toward the condenser

D. In any line as long as the arrow points away from flow

57. When making the final electrical connections on a three-phase compressor, why must rotation direction be verified?

A. To set the correct refrigerant charge during commissioning

B. Reverse rotation can cause a scroll compressor to fail or not pump

C. To ensure the condensate drain flows in the right direction

D. To match the colour code of the line voltage conductors

58. A condensate pump is installed for a cooling coil below the drain level. What safety control should be wired with it?

A. A high-pressure refrigerant cutout in series with the coil

B. A float switch that disables cooling on a high-water condition

C. A time-delay relay that delays compressor start by ten minutes

D. A current-sensing relay that monitors the supply fan motor

59. During installation of refrigerant piping, why are line sets typically insulated only on the suction line for a cooling-only split system?

A. The liquid line is too hot for any insulation to be effective

B. Insulation on the liquid line would block refrigerant flow

C. The cold suction line would otherwise sweat and lose capacity

D. The suction line carries high-pressure liquid that must stay warm

60. A technician installs a sight glass with a moisture indicator in the liquid line. Bubbles appearing in the sight glass during steady operation usually indicate what?

A. The system is fully charged and operating normally

B. The compressor oil level is too high in the crankcase

C. Excess moisture has been completely removed from the system

D. A low refrigerant charge or a restriction upstream

61. When installing a packaged rooftop unit, the gas-fired heating section requires what for safe combustion?

A. A sealed cabinet with no openings to the outdoors

B. A reduced gas pressure below the manifold rating

C. Insulation packed around the burner assembly

D. Adequate combustion air and proper venting of flue gases

62. A technician must install a refrigerant line through a fire-rated wall. What is required at the penetration?

A. The line must be left uninsulated through the wall

B. The penetration must be left open for air circulation

C. An approved firestop system maintaining the wall's rating

D. The line must be doubled in diameter at the wall

63. During installation, the manufacturer specifies torque values for flare connections. Why is correct torque important?

A. Higher torque always produces a better seal regardless of value

B. Torque value only matters for threaded electrical connections

C. Torque has no effect once the flare nut is hand-tight

D. Over-torquing can crack the flare while under-torquing leaks

64. A technician installs a low-voltage transformer for a control circuit. The primary is 240 V and the secondary is 24 V. If the secondary is short-circuited, what protects the transformer?

A. The high-pressure refrigerant cutout opens the circuit

B. The thermostat opens to remove the call for cooling

C. The compressor contactor drops out automatically

D. An inline fuse or internal thermal protection on the transformer

65. When installing a horizontal evaporator coil in an air handler, why is the condensate pan slope critical?

A. An improper slope causes standing water and overflow problems

B. The slope determines the refrigerant charge required

C. A steep slope increases the system's cooling capacity

D. The pan slope sets the airflow direction across the coil

66. A technician brazes the final connection on a system that still contains a trace refrigerant charge. What hazard does this create?

A. The refrigerant will increase brazing temperature efficiency

B. Refrigerant exposed to a flame can form toxic decomposition gases

C. The refrigerant improves the strength of the brazed joint

D. The trace charge prevents oxide formation inside the tube

67. When installing ductwork, why are flexible connectors used at the air-handler discharge?

A. To increase the static pressure delivered to the space

B. To filter particulates from the supply airstream

C. To reduce the cross-sectional area of the duct

D. To isolate fan vibration and noise from the duct system

68. A three-phase condensing unit nameplate lists MCA of 24 A and MOCP of 40 A. What does MOCP specify?

A. The minimum conductor size required for the circuit

B. The maximum overcurrent protection (fuse/breaker) allowed

C. The maximum refrigerant charge in kilograms

D. The minimum starting torque of the compressor

69. After installing a new system, the technician must label the disconnect and equipment. What is the primary purpose of clear labelling?

A. To meet the refrigerant manufacturer's warranty colour scheme

B. To allow safe identification and isolation during future service

C. To increase the resale value of the building structure

D. To indicate the date the refrigerant was last topped up

70. A technician is servicing a residential heat pump and must explain the role of the reversing valve in the refrigeration circuit. What is the primary function of this valve?

A. It meters refrigerant into the indoor coil during the heating cycle

B. It prevents liquid refrigerant from slugging back to the compressor

C. It redirects refrigerant flow to switch the system between heating and cooling

D. It regulates head pressure by modulating condenser airflow

71. A technician installs an accumulator in the suction line of a heat pump. What is its main function?

A. To increase the suction pressure entering the compressor

B. To prevent liquid refrigerant slugging from reaching the compressor

C. To meter refrigerant into the indoor coil during heating

D. To store excess oil away from the refrigerant circuit

72. During installation, the supply duct is sized for 1,200 CFM but the return is undersized. What is the likely consequence?

A. The system will deliver excess airflow and overcool the space

B. Restricted return airflow can lower coil temperature and cause icing

C. The compressor amperage will drop below the rated minimum

D. The condensate production will stop entirely at the coil

73. When installing refrigerant tubing outdoors, why should it be protected from UV exposure where insulation is used?

A. UV light increases the refrigerant pressure inside the line

B. UV exposure improves the appearance of the insulation

C. UV light has no measurable effect on pipe insulation

D. UV exposure degrades many insulation materials over time

74. A technician installs a crankcase heater on a compressor. What problem does it prevent during cold-weather off-cycles?

A. It prevents the discharge line from freezing solid

B. It keeps the condenser fan motor from seizing

C. It prevents refrigerant migration and oil dilution in the crankcase

D. It maintains a constant suction pressure during the off cycle

75. When connecting line-voltage power to a unit, why is proper conductor sizing based on ampacity critical?

A. Larger conductors always reduce the system cooling capacity

B. Undersized conductors overheat and create a fire hazard

C. Conductor size only affects the control circuit voltage

D. Conductor size determines the refrigerant flow rate

76. A technician installs an oil separator on the discharge line of a low-temperature system. What does it accomplish?

A. It returns oil to the compressor before it travels through the system

B. It removes moisture from the high-pressure discharge gas

C. It increases the discharge pressure for better condensing

D. It meters refrigerant into the condenser at a fixed rate

77. During commissioning, a technician measures 12°C of subcooling against a manufacturer target of 6°C. What does this most likely indicate?

A. The system is undercharged with refrigerant

B. The metering device is oversized for the load

C. The suction line insulation is missing or damaged

D. The system is overcharged with refrigerant

78. A technician commissioning a TXV system measures evaporator superheat of 2°C against a target of 8°C. What is the likely cause?

A. The TXV is starving the evaporator of refrigerant

B. The liquid line filter drier is severely restricted

C. The TXV is overfeeding the evaporator with refrigerant

D. The condenser fan motor has failed completely

79. When commissioning a system, why is the refrigerant charge weighed in rather than charged by pressure alone on a TXV system?

A. Pressure charging is always more accurate for any system

B. Weighing prevents the need for any gauges during charging

C. Weighing to the manufacturer's spec gives the precise correct charge

D. Pressure charging requires removing the metering device

80. During startup of a three-phase system, the technician reads unbalanced voltage across the three legs exceeding the allowable limit. What is the risk?

A. The refrigerant will overcharge automatically

B. Voltage imbalance causes excessive motor heating and winding damage

C. The condensate drain will reverse its flow direction

D. The superheat reading will become permanently fixed

81. A psychrometric measurement during commissioning shows 14°C of dry-bulb temperature drop across the evaporator coil. For a typical comfort-cooling system, this value is:

A. Far too low, indicating a severely overcharged system

B. Impossible to achieve on any refrigeration system

C. An indication of a completely failed compressor

D. Within the normal expected range for a properly operating coil

82. During commissioning, the technician performs a vacuum test and the micron gauge rises and stabilizes at a level well above target. What does stabilization at a high level indicate?

A. The system is perfectly dry and leak-free

B. Moisture is present, off-gassing into the vacuum

C. A leak is admitting outside atmosphere continuously

D. The vacuum pump oil needs immediate replacement

83. When commissioning a control system, what is the purpose of verifying the thermostat differential setting?

A. To set the refrigerant subcooling at the condenser

B. To determine the size of the electrical disconnect

C. To establish the brazing temperature for repairs

D. To control how far temperature swings before cycling

84. A technician commissioning a system finds the compressor running but suction and discharge pressures nearly equal. What does this suggest?

A. The system is perfectly balanced and operating correctly

B. The compressor is not pumping, possibly a failed valve

C. The condenser fan is running at excessive speed

D. The refrigerant charge is exactly at the design level

85. During commissioning of an airflow system, the technician measures total external static pressure higher than design. What is a likely cause?

A. The ductwork is significantly oversized for the airflow

B. The supply registers are all fully open and unobstructed

C. The fan motor is running below its rated speed

D. A dirty filter or closed dampers are restricting airflow

86. When commissioning a heat pump in heating mode, frost builds on the outdoor coil. What system function manages this?

A. The defrost control initiates a cycle to clear the frost

B. The crankcase heater melts the frost from inside the coil

C. The liquid-line filter drier absorbs the frost moisture

D. The suction accumulator vaporizes the frost layer

87. During commissioning, a technician records the following on a cooling system: high subcooling, low superheat, and higher-than-normal head pressure. What is the most probable single cause?

A. A low refrigerant charge in the system

B. A restricted suction line near the compressor

C. A failed indoor blower motor capacitor

D. An overcharge of refrigerant in the system

88. Why is it important to verify the actual amperage draw of the compressor against the rated load amps (RLA) during commissioning?

A. Amperage draw determines the correct refrigerant type

B. Amperage indicates the condensate drain slope accuracy

C. Amperage has no relationship to compressor loading

D. High amperage can indicate overload, high head, or mechanical issues

89. A technician commissioning a system must confirm the low-pressure control setpoint. What does this control primarily protect against?

A. Compressor operation at unsafely low suction pressures

B. Excessive condensing temperature at the outdoor coil

C. Overvoltage conditions in the control transformer

D. Reverse rotation of a three-phase compressor motor

90. During airflow commissioning, the technician adjusts a balancing damper. What measurement confirms the correct setting at a diffuser?

A. The refrigerant subcooling at the condenser outlet

B. The line voltage supplied to the air handler

C. The measured airflow in CFM at the diffuser

D. The discharge pressure of the compressor

91. When commissioning a system using a temperature-glide refrigerant blend, why is charging done in the liquid phase?

A. Liquid charging maintains the correct blend composition

B. Vapour charging is faster and equally accurate for blends

C. Liquid charging removes the need for a metering device

D. Vapour charging prevents the compressor from flooding

92. A technician records superheat and subcooling readings during commissioning to verify charge. On a fixed-orifice system, which reading is primarily used to confirm correct charge?

A. The subcooling at the condenser outlet only

B. The superheat using the manufacturer's charging chart

C. The discharge line temperature at the compressor

D. The condensate drain temperature at the pan

93. During commissioning, why should the technician confirm proper condensate drainage by pouring water into the pan?

A. To measure the refrigerant charge level in the system

B. To verify the supply air temperature at the diffuser

C. To confirm the trap and drain line carry water away without backup

D. To set the thermostat differential for the cooling stage

94. A technician commissioning a walk-in freezer must verify the defrost cycle. What is the primary goal of the defrost cycle?

A. To increase the freezer's refrigeration capacity at startup

B. To recover refrigerant from the evaporator periodically

C. To remove ice accumulation from the evaporator coil

D. To lower the suction pressure for colder box temperature

95. When commissioning a system, the technician verifies the high-pressure cutout by what method?

A. Reducing the refrigerant charge until the control trips

B. Disconnecting the control wiring during operation

C. Lowering the suction pressure with a service valve

D. Simulating or inducing high pressure to confirm the trip point

96. During commissioning, why is it important to record baseline operating data such as pressures, temperatures, and amperages?

A. To set the manufacturer's warranty colour coding

B. To determine the resale value of the equipment

C. To provide a reference for future service diagnostics

D. To calculate the brazing temperature for repairs

97. A technician commissioning a multi-stage cooling system must verify staging operation. What confirms correct staging?

A. Each stage energizes in sequence as the load increases

B. All stages energize simultaneously on the first call

C. The stages alternate randomly during operation

D. Only the final stage operates regardless of load

98. During routine maintenance, a dirty condenser coil is found on an air-cooled system. What operating symptom does this most directly cause?

A. Higher head pressure and reduced system efficiency

B. Lower head pressure and excessive subcooling

C. Reduced suction pressure and high superheat

D. Increased refrigerant charge in the receiver

99. A technician servicing a system finds the suction line frosting back to the compressor. What is the most likely cause?

A. The condenser fan is running at excessive speed

B. A low load or overfeeding condition flooding the suction line

C. The high-pressure cutout has failed in the open position

D. The crankcase heater is drawing excessive current

100. During maintenance, a belt-driven blower shows glazed, cracked belts. What is the correct service action?

A. Apply belt dressing and return the unit to service immediately

B. Replace the belts and check sheave alignment and tension

C. Tighten the belts as much as possible to stop slipping

D. Remove the belts and run the blower direct-coupled

101. A technician is recovering refrigerant for service. According to environmental regulations, what is required?

A. Recover into an approved cylinder; venting to atmosphere is prohibited

B. Vent small amounts to atmosphere if under one kilogram

C. Mix recovered refrigerants of different types in one cylinder

D. Release refrigerant slowly to reduce environmental impact

102. During service, a compressor is found to have grounded windings on a megohmmeter test. What does this indicate?

A. The compressor windings are in perfect condition

B. The motor insulation has failed and the compressor must be replaced

C. The refrigerant charge is slightly low in the system

D. The capacitor needs to be replaced before restart

103. A technician servicing a TXV system suspects the sensing bulb has lost its charge. What symptom would confirm this?

A. The valve closes and starves the evaporator of refrigerant

B. The valve opens fully and floods the evaporator completely

C. The subcooling increases dramatically at the condenser

D. The head pressure drops well below normal operating range

104. During maintenance, a technician measures a run capacitor reading far below its rated microfarad value. What is the result?

A. The motor will run faster than its rated speed

B. The capacitor will improve the motor's efficiency

C. The motor will have no effect on its performance

D. The motor may fail to start or run with reduced torque

105. A technician finds non-condensable gases (air) in a refrigeration system during service. How does this typically present?

A. Higher-than-normal head pressure for the condensing temperature

B. Lower-than-normal head pressure and excessive subcooling

C. Reduced superheat and frosting at the evaporator

D. A vacuum forming in the high side during operation

106. During service of an electrical control circuit, a contactor's contacts are found pitted and burned. What is the correct action?

A. Replace the contactor rather than filing the contacts

B. File the contacts smooth and return to service

C. Apply dielectric grease to the burned contacts

D. Increase the control voltage to overcome the resistance

107. A technician servicing a hermetic compressor must check for an open internal overload. With power off, what test confirms continuity?

A. A pressure test of the discharge service valve

B. A vacuum decay test on the low side of the system

C. A resistance check across the motor terminals with a meter

D. A subcooling measurement at the condenser outlet

108. During maintenance, why should a technician periodically inspect and clean condensate drain pans and traps?

A. To increase the refrigerant subcooling at the condenser

B. To raise the suction pressure during the cooling cycle

C. To prevent microbial growth, blockages, and water overflow

D. To reduce the compressor amperage draw during operation

109. A technician servicing a system measures normal subcooling but high superheat and low suction pressure. What does this indicate?

A. A restriction such as a clogged filter drier or starved TXV

B. A severe overcharge of refrigerant in the system

C. A failed condenser fan motor causing high head

D. Excessive oil circulating throughout the system

110. During service, a three-phase motor hums but does not start, and one leg shows no current. What is the likely fault?

A. The refrigerant charge is too high for startup

B. The condensate pump float is stuck in the up position

C. The crankcase heater is consuming all the current

D. A single-phasing condition from a blown fuse or open leg

111. A technician must add refrigerant to a system using a blend with temperature glide. From the cylinder, refrigerant should be removed as:

A. Vapour from the top of an upright cylinder

B. Whichever phase is convenient at the time

C. Liquid, often through a metering valve, to preserve composition

D. A mixture by inverting and shaking the cylinder

112. During maintenance, the technician finds the evaporator coil iced over on an air-conditioning system. After confirming airflow is adequate, what is the next most likely cause to investigate?

A. A low refrigerant charge causing low coil temperature

B. An overcharge of refrigerant in the condenser

C. A failed crankcase heater on the compressor

D. A blocked condensate drain line at the trap

113. A technician services a system and must leak-check after a repair. Which method is most sensitive for locating small refrigerant leaks?

A. Visual inspection of the joints with a flashlight

B. Listening for hissing sounds near the connections

C. Spraying soap bubbles only on accessible joints

D. An electronic leak detector calibrated for the refrigerant

114. During service, why is it important to replace the liquid-line filter drier after opening a sealed system for repair?

A. The old drier increases the system's cooling capacity

B. A new drier is required only for cosmetic appearance

C. The old drier improves refrigerant flow when reused

D. The old drier may be saturated and cannot protect the system

115. A technician servicing a heat pump finds it stuck in defrost and not returning to heating. What component should be checked first?

A. The indoor blower motor run capacitor

B. The liquid-line sight glass for bubbles

C. The defrost control board and termination sensor

D. The condensate drain pan float switch

116. During maintenance, an oversized motor pulley is found on a belt-drive blower. What effect does increasing blower speed have?

A. It increases airflow and motor amperage draw

B. It decreases airflow and motor amperage draw

C. It has no effect on airflow or amperage

D. It reverses the direction of the airflow

117. A technician servicing a commercial refrigeration rack finds oil logging in an evaporator. What does this typically indicate?

A. The system has too much refrigerant subcooling

B. The condenser is rejecting excessive amounts of heat

C. Poor oil return, often from low velocity or piping issues

D. The high-pressure cutout is set too high for the load

118. During service, why must a technician verify that recovered refrigerant cylinders are not overfilled?

A. Overfilling improves the recovery machine's efficiency

B. Overfilling leaves no vapour space, risking hydrostatic rupture

C. Overfilling has no safety consequence at room temperature

D. Overfilling reduces the cylinder's internal pressure safely

119. A technician servicing a system finds the compressor cycling on its internal overload repeatedly. After checking for high head pressure, what else should be investigated?

A. Low voltage, a failed capacitor, or a mechanical bind

B. The colour of the suction line insulation jacket

C. The slope of the condensate drain line only

D. The brand name printed on the refrigerant cylinder

120. During maintenance, why should a technician check refrigerant subcooling in addition to superheat when diagnosing a charge problem?

A. Subcooling measures only the airflow across the coil

B. Subcooling is irrelevant to refrigerant charge diagnosis

C. Superheat alone always identifies every charge fault

D. Together they isolate whether the issue is charge or metering

121. A technician must service a system containing a flammable A2L refrigerant. What additional precaution is required?

A. Eliminate ignition sources and ensure proper ventilation

B. Use a standard recovery machine rated for any gas

C. Braze with an open flame near the charge port freely

D. Ignore leak detection since A2L is only mildly flammable

122. During service, a technician notices a hot, discoloured compressor discharge line and a burnt odour. What does this suggest?

A. The system is operating well within normal parameters

B. The refrigerant charge is slightly below the target level

C. Excessive discharge temperature, possibly low charge or restriction

D. The condensate drain is overflowing into the cabinet

123. A technician performs preventive maintenance on a cooling tower-condenser water loop. What water-treatment concern is most important?

A. Increasing water flow to raise the condensing temperature

B. Reducing airflow across the tower fill material

C. Eliminating the makeup water supply entirely

D. Controlling scale, corrosion, and biological growth

124. During service, the technician finds that a system has lost its entire refrigerant charge with no obvious leak. What is the correct procedure before recharging?

A. Pressure-test with nitrogen, locate and repair the leak, then evacuate

B. Recharge immediately and watch for the charge to drop again

C. Add extra refrigerant to compensate for the expected loss

D. Install a larger receiver to hold more refrigerant reserve

125. A technician completes a service call and must document the work. What information is most important to record for refrigerant compliance?

A. The colour of the equipment cabinet and its location

B. The brand of tools used during the service call

C. The type and quantity of refrigerant added or recovered

D. The ambient temperature in the parking lot outside

Practice Exam 16: Answer Key and Explanations

1. B — Refrigerant displaces oxygen in enclosed spaces, creating an asphyxiation hazard before any other concern. A walk-in cooler after a large leak may have a dangerously low oxygen concentration. Verifying oxygen levels and ventilating must come first because life safety precedes equipment or tool considerations.

2. A — A supplier label is required on every hazardous product container, and a damaged or missing one must be replaced. Until a proper label is restored, the product is quarantined to prevent unidentified-hazard exposure. A workplace label only applies to products decanted from a properly labelled supplier container, not to the original.

3. C — Acetylene becomes chemically unstable and can decompose explosively above roughly 15 psig (103 kPa). Regulators are designed so the working pressure stays at or below this limit. Keeping acetylene under 15 psig is a fundamental fuel-gas safety rule that prevents detonation in the hose or cylinder.

4. B — A sling's safe working load drops as the sling angle decreases from vertical, because the tension in each leg rises. Capacity reduction factors at given angles directly determine whether a sling can safely carry the load. Length, colour, and ambient temperature do not govern rated capacity the way sling angle does.

5. C — The safety data sheet for a specific refrigerant is the authoritative source for its hazards, PPE, and handling requirements. Installation manuals and training standards do not provide chemical hazard data. Consulting the SDS before working with an unfamiliar refrigerant is the required first step under WHMIS.

6. D — Addressing a coworker conflict directly and professionally to clarify the work plan is the appropriate first step before escalation. Trade communication standards favour resolving issues at the lowest effective level. Reporting to a regulator or refusing to proceed is disproportionate as an initial response.

7. B — A micron gauge measures deep vacuum in microns of mercury during evacuation, confirming the system is dry and leak-free before charging. It does not read mass, superheat, or winding resistance. Achieving a low, stable micron level is the standard benchmark for proper evacuation.

8. D — Grinding produces flying sparks and metal particles plus high noise, requiring eye, face, hand, and hearing protection together. A face shield over safety glasses guards against fragments while gloves and hearing protection address the remaining hazards. A dust mask or respirator alone does not address the impact and noise risks.

9. B — The most effective hands-on mentoring is demonstrating the task, then supervising the apprentice while they perform it. This combines modelling with immediate, corrective feedback. Written procedures or videos alone lack the guided practice that builds reliable skill.

10. C — A tubing cutter with a sharp wheel produces a clean, square cut without crushing soft copper. Saws and abrasive wheels leave burrs, debris, and out-of-round ends. A square, debris-free cut is essential for proper flares, swages, and brazed joints.

11. D — A job hazard assessment exists to identify site hazards and establish control measures before work begins. It is a safety planning tool, not an invoicing or refrigerant-selection step. Performing it first protects the technician and occupants in an active commercial space.

12. A — Reviewing the work order and confirming the parts and tools needed is the correct first organizational step on a service call. This prevents wasted trips and ensures the right diagnosis path. Recovering refrigerant or replacing parts before diagnosis would be premature.

13. D — Compressed-gas cylinders are transported upright with the valve cap secured and chained to a cylinder cart. The cap protects the valve from damage that could turn the cylinder into a projectile. Laying down, rolling, or removing the cap before transport are all unsafe practices.

14. D — Laying protective coverings over flooring and furnishings is the work-site preparation step that directly protects the customer's property in a finished space. Ventilation, condensate routing, and breaker checks are part of the job but do not protect finishes. Property protection is a standard pre-work courtesy and professional obligation.

15. B — Purging dry nitrogen through tubing during brazing prevents oxygen from forming copper-oxide scale on the inner walls. That scale flakes off and can clog metering devices and contaminate oil. Nitrogen purging is standard practice to keep the internal surfaces clean.

16. C — A rough, grainy joint with poor penetration results from improper heat — either too little for capillary flow or so much that the filler is overheated. Correct brazing relies on bringing the base metal to the proper temperature so filler is drawn in by capillary action. Nitrogen flow and flux thickness affect oxidation, not penetration this way.

17. B — Reaming removes the internal burr left by cutting, which would otherwise restrict flow and create turbulence and oil-trapping points. A clean, full-bore inside diameter preserves designed refrigerant and oil flow. Reaming does not enlarge the OD or work-harden the tube.

18. D — A spring bender or lever-type tube bender sized to the tubing produces a smooth bend without kinking. Freehand or over-an-edge bending collapses the tube wall. Proper bending tools maintain the bore through the radius, preserving flow.

19. D — A cracked, uneven flare typically results from over-flaring or a tube end that was not deburred before flaring. Burrs and excess material stress the copper as it forms. A properly cut, deburred, and correctly seated tube produces a smooth, leak-tight flare.

20. A — Soft-soldered 50/50 tin-lead joints lack the strength and temperature rating for high-pressure refrigerant liquid lines. Refrigeration high-side joints require brazed connections using silver or phos-copper filler. Soft solder is reserved for low-pressure water or drain applications, not refrigerant pressure.

21. C — Dry nitrogen is the correct pressure-test gas because it is inert, will not react with refrigerant oil, and introduces no moisture. Oxygen is dangerous with oil, refrigerant wastes product, and shop air adds moisture. Nitrogen gives a clean, safe pressure test.

22. B — A swage depth of roughly one tube diameter provides adequate joint overlap for a strong brazed connection. Too shallow a swage gives insufficient bonding surface. Matching depth to tube diameter is the common field rule for sound swaged joints.

23. B — Excess flux left inside a line can react with refrigerant and oil, causing contamination, acid formation, and metering-device fouling. Flux belongs only on the external joint surfaces in minimal amounts. Internal residue is a known source of long-term system problems.

24. D — Phos-copper (BCuP) filler is self-fluxing on copper-to-copper joints, so no separate flux is needed. The phosphorus acts as a deoxidizer on copper. This makes BCuP convenient and clean for copper joints, though flux is still required when joining to dissimilar metals.

25. B — Gas-line threads are sealed with an approved pipe-thread sealant rated for the specific gas service. Refrigeration oil, brazing flux, and temperature-only anti-seize are not gas-rated sealants. Using the correct rated compound ensures a leak-tight, code-compliant gas joint.

26. B — An oversized torch tip delivers too much heat to small tubing, overheating the joint and burning out the flux before the filler flows. This leads to oxidation and weak joints. Matching tip size to tube diameter controls heat input for a clean braze.

27. C — Verifying that the curb dimensions and gasket match the new unit's footprint is the key pre-replacement check for a rooftop unit. A mismatch causes air leaks, water entry, and mounting problems. Curb colour, paint age, or insulation fill are not the dimensional fit concerns.

28. C — The correct sequence is to recover or isolate the refrigerant and purge the section with nitrogen before applying a brazing flame. This prevents flame contact with refrigerant and pressurized gas. Brazing on a charged or open-without-purge section is unsafe and produces contamination.

29. A — A condensate drain line is sloped about 1% — roughly 1/8 inch per foot — to drain by gravity without standing water. A level or reverse slope causes backup and overflow. Adequate downward slope ensures continuous, reliable drainage.

30. B — A sediment trap, or drip leg, captures debris and condensate in the gas line before it can reach the appliance control valve. This protects the valve and burner from contamination. It is not a pressure regulator or the primary shutoff.

31. D — Hanger spacing must prevent sag and stress on copper lines while allowing for thermal expansion and contraction. Over-spacing causes sagging and strain at joints. Proper spacing and isolation maintain alignment through temperature swings.

32. A — Galvanic corrosion occurs when copper contacts a dissimilar metal such as a bare steel hanger in the presence of moisture. Isolation between dissimilar metals prevents the corrosion cell. Copper-to-copper, foam insulation, and plastic clips do not create this galvanic risk.

33. A — Suction lines must maintain adequate refrigerant velocity to carry oil back to the compressor, especially up vertical risers. Too low a velocity lets oil log in the evaporator and starve the compressor. Oil return is the governing design goal for suction sizing.

34. C — Dew point is found by following the constant-moisture (horizontal) line to where it meets the saturation curve on a psychrometric chart. That intersection defines the temperature at which condensation begins. It is not read from the dry-bulb/RH crossing or chart edges directly.

35. A — A P-trap at the base of a suction riser collects oil so accumulated slugs can be carried up the riser by refrigerant velocity. This ensures oil returns to the compressor on tall vertical runs. It is not for condensate drainage or vibration isolation.

36. C — Cold-storage heat loads must include product respiration and infiltration heat gained through frequent door openings, which are unique to such spaces. These loads are easily underestimated yet significant. Glass solar gain and rooftop condenser heat are not the defining cold-room loads.

37. A — A TXV is selected to match the evaporator load and the design pressure drop across the valve. An oversized or undersized valve hunts or starves the coil. Capacity matching to load and pressure drop ensures stable, correct refrigerant feed.

38. B — A condensing unit needs adequate clearance for airflow and heat rejection to operate efficiently. Restricted airflow raises head pressure and reduces capacity. Electrical proximity, appearance, and drain routing are secondary to condenser airflow.

39. C — A fan-to-cooling interlock prevents the cooling stage from running unless airflow is proven, protecting the coil from freezing and the compressor from liquid floodback. Proven airflow is a prerequisite for safe cooling operation. It is not a capacity, defrost, or thermostat-bypass function.

40. C — Low-voltage control circuits use multi-conductor, color-coded thermostat cable. This wiring is rated for the 24 V control circuit, not line voltage. Armoured line-voltage cable, heating cable, and bare grounding conductor are inappropriate for thermostat connections.

41. B — A vertical liquid-line lift causes a static pressure drop that can lower the refrigerant below its saturation pressure, producing flash gas at the TXV inlet. Flash gas reduces metering capacity and performance. The lift's pressure loss, not gravity flashing or oil accumulation, is the design concern.

42. A — Increasing duct size at the same airflow lowers air velocity, which reduces friction loss and static pressure. Larger cross-section means less resistance. Smaller ducts raise velocity and static pressure, the opposite effect.

43. C — A normally closed high-pressure cutout carries the circuit during normal operation and opens when pressure rises above its setpoint, stopping the compressor. Opening on high pressure is the protective action. It does not modulate speed or close on fault.

44. B — Global warming potential (GWP) is now a primary regulatory driver in refrigerant selection due to environmental phase-down rules. Lower-GWP refrigerants are favoured to meet regulations. Boiling point and viscosity matter technically but are not the leading regulatory consideration.

45. A — A vacuum decay (standing vacuum) test confirms the system holds a deep vacuum after evacuation, indicating no leaks and no off-gassing moisture. A rising micron level signals trouble. It verifies system integrity before charging, not superheat or charge weight.

46. A — Equivalent length adds the friction-equivalent loss of fittings, valves, and bends to the straight-pipe length. Each fitting behaves like a length of pipe for pressure-drop calculation. Building height, charge weight, and ambient temperature are not part of equivalent length.

47. C — Electrical disconnect and conductor sizing are based on the nameplate minimum circuit ampacity and maximum fuse size. These values define the circuit's protection and conductor requirements. Refrigeration tonnage, refrigerant type, and cabinet size do not set the electrical rating.

48. C — A time-delay (anti-short-cycle) relay prevents rapid restarting of the compressor, allowing pressures to equalize and protecting the motor. Short-cycling causes overheating and high starting current. The relay is a protective timing device, not a torque or voltage control.

49. D — A continuous vapour barrier on cold suction or chilled-water lines prevents moisture migration into the insulation, which would cause condensation, dripping, and loss of R-value. Wet insulation fails and corrodes the pipe. The barrier protects insulation performance, not appearance or structure.

50. B — A receiver stores liquid refrigerant and accommodates charge variations between operating conditions. It ensures a solid liquid column to the metering device. It does not superheat vapour, purge non-condensables, or meter refrigerant flow.

51. A — The external equalizer connects to the suction line just downstream of the TXV sensing bulb, sensing evaporator-outlet pressure to compensate for coil pressure drop. This lets the valve maintain correct superheat. Connecting it to the liquid or discharge side would defeat its purpose.

52. D — A TXV bulb is clamped to the upper side of a horizontal suction line, typically the 10 or 2 o'clock position, to avoid sensing oil at the bottom. Good thermal contact gives an accurate temperature reading. The 6 o'clock position or loose taping yields false readings.

53. C — Vibration isolators under a condensing unit prevent transmission of vibration and noise into the building structure. This reduces noise complaints and structural fatigue. They do not address refrigerant leaks, electrical arcing, or compressor heat.

54. A — Long line sets require adding refrigerant per the manufacturer's chart based on line length beyond the factory pre-charge. The extra tubing volume needs additional charge. Reducing or ignoring the charge, or changing refrigerant type, would misfeed the system.

55. B — Wiring passing through a sheet-metal panel must be protected by a grommet or connector to prevent the sharp edge from abrading the insulation. Abraded insulation can cause a ground fault or short. The protection guards insulation, not ampacity or voltage drop.

56. A — A liquid-line filter drier is installed in the liquid line with its arrow pointing toward the metering device, matching refrigerant flow direction. This places it to trap moisture and debris before the TXV or orifice. Reversed or wrong-line placement defeats its protective function.

57. B — Three-phase rotation must be verified because reverse rotation can prevent a scroll compressor from pumping and can damage it. Correct phase rotation ensures proper compression. Rotation does not set charge, drain flow, or conductor colour.

58. B — A condensate pump should be interlocked with a float switch that disables cooling on a high-water condition, preventing overflow and water damage. This protects the building if the pump fails. A pressure cutout, time delay, or fan relay does not address condensate overflow.

59. C — The cold suction line is insulated because it would otherwise sweat (condense moisture) and lose capacity through heat gain. The liquid line is warm and not prone to sweating in a cooling-only system. Insulation does not block flow or keep the line warm here.

60. D — Bubbles in a liquid-line sight glass during steady operation usually indicate a low charge or a restriction upstream causing flash gas. A clear glass indicates a solid liquid column. Bubbles are a diagnostic flag, not a sign of normal full charge.

61. D — A gas-fired heating section requires adequate combustion air and proper flue-gas venting for safe operation. Without them, incomplete combustion and carbon monoxide can result. Sealing the cabinet, reducing gas pressure, or packing insulation would compromise safe combustion.

62. C — A refrigerant line through a fire-rated wall must use an approved firestop system that maintains the wall's fire rating at the penetration. Leaving it open or uninsulated breaches the rating. Doubling the pipe diameter is irrelevant to fire separation.

63. D — Manufacturer torque specs matter because over-torquing can crack the flare while under-torquing leaves a leaking joint. Correct torque produces a reliable metal-to-metal seal. More torque is not always better, and hand-tight alone is insufficient.

64. D — A control transformer is protected from a secondary short by an inline fuse or built-in thermal protection that opens before the windings burn. Pressure cutouts, thermostats, and contactors do not protect the transformer from a secondary fault. Overcurrent protection is the safeguard.

65. A — A condensate pan must slope correctly toward the drain, or improper slope leaves standing water that overflows and breeds growth. Proper slope ensures the pan empties fully. Pan slope does not set charge, capacity, or airflow direction.

66. B — Brazing on a system holding even trace refrigerant exposes it to flame, which can decompose the refrigerant into toxic gases such as phosgene and hydrogen fluoride. This is a serious health hazard. The trace charge does not aid brazing — it must be removed and the line purged.

67. D — Flexible duct connectors at the air handler isolate fan vibration and noise from the duct system. They prevent structure-borne noise transmission. They do not raise static pressure, filter air, or reduce duct area.

68. B — MOCP is the maximum overcurrent protection — the largest fuse or breaker permitted for the circuit. MCA sets the minimum conductor ampacity. MOCP protects against short circuits and ground faults, not minimum wire size, charge, or torque.

69. B — Clear equipment and disconnect labelling allows safe identification and isolation of the system during future service. Technicians can confirm what they are de-energizing. Labelling is a safety and serviceability measure, not a warranty or resale-value step.

70. C — The reversing valve (four-way valve) redirects discharge and suction flow so the indoor and outdoor coils swap roles, switching the heat pump between heating and cooling. This flow reversal is what allows a single system to both heat and cool. Metering, liquid protection, and head-pressure control are handled by other components..

71. B — A suction-line accumulator prevents liquid refrigerant slugging from reaching the compressor, protecting it during transient flooding such as defrost on a heat pump. It traps liquid and meters it back slowly. It does not raise suction pressure, meter the coil, or store oil away from the circuit.

72. B — An undersized return restricts airflow, lowering the evaporator coil temperature and causing it to ice over. Reduced return air starves the coil of heat load. This reduces capacity and can freeze the coil, not overcool the space or stop condensate.

73. D — UV exposure degrades many pipe-insulation materials over time, so outdoor insulation must be UV-protected with jacketing or UV-rated covering. Degraded insulation crumbles and loses R-value. UV does not raise refrigerant pressure or improve appearance.

74. C — A crankcase heater prevents refrigerant migration to and condensation in the crankcase during cold off-cycles, which would dilute the oil and cause a slug at startup. Warm oil keeps refrigerant from collecting. It does not address discharge freezing, fan seizure, or suction pressure.

75. B — Conductors must be sized to their ampacity because undersized wire overheats under load and creates a fire hazard. Proper ampacity sizing keeps conductor temperature safe. Larger wire does not cut capacity, and conductor size does not set control voltage or refrigerant flow.

76. A — A discharge-line oil separator captures oil and returns it to the compressor before it circulates through the system, which is important on low-temperature systems where oil return is difficult. This keeps the compressor lubricated. It does not remove moisture, raise head pressure, or meter refrigerant.

77. D — High subcooling (12°C versus a 6°C target) indicates more liquid is backing up in the condenser than designed, the classic sign of an overcharge. Excess refrigerant raises subcooling and head pressure. An undercharge would lower subcooling, not raise it.

78. C — Very low superheat (2°C versus an 8°C target) means the evaporator is being overfed, so the TXV is letting too much refrigerant through. Low superheat risks liquid floodback to the compressor. A starved coil or restriction would raise superheat, not lower it.

79. C — On a TXV system the charge is weighed in to the manufacturer's specification because the valve maintains superheat across conditions, making pressure-only charging unreliable. Weighing delivers the precise correct charge. Pressure charging alone cannot confirm the exact mass on a TXV system.

80. B — Voltage imbalance across the three legs beyond the allowable limit causes excessive current and heating in motor windings, leading to insulation failure. A small percentage imbalance produces a much larger current imbalance. It does not affect charge, drain flow, or superheat.

81. D — A 14°C dry-bulb temperature drop across an evaporator coil falls within the normal range for properly operating comfort cooling, which is roughly 8–14°C. It indicates the coil is removing heat as designed. This value does not signal overcharge, compressor failure, or an impossible condition.

82. B — When the vacuum pump is valved off and the micron reading rises then stabilizes at a high level, moisture is off-gassing into the system. A continuous rise without stabilizing would indicate a leak. Stabilization at a high level is the signature of trapped moisture, not dryness.

83. D — The thermostat differential sets how far temperature must swing before the equipment cycles on and off. A correct differential prevents short-cycling while maintaining comfort. It governs cycling, not subcooling, disconnect sizing, or brazing.

84. B — A running compressor with suction and discharge pressures nearly equal indicates the compressor is not pumping, often from failed valves. Equalized pressures mean no effective compression. This is a fault condition, not balanced normal operation.

85. D — Higher-than-design external static pressure points to airflow restriction such as a dirty filter or closed dampers. Increased resistance raises static pressure. Oversized ducts, fully open registers, or low fan speed would lower, not raise, measured static.

86. A — Frost on the outdoor coil in heating mode is cleared by the defrost control initiating a defrost cycle. The control reverses operation or applies heat to melt the frost. Crankcase heaters, filter driers, and accumulators do not perform coil defrost.

87. D — High subcooling, low superheat, and high head pressure together point to an overcharge of refrigerant. The excess liquid floods the condenser (raising subcooling and head) and overfeeds the evaporator (lowering superheat). A low charge would produce the opposite readings.

88. D — Comparing actual amperage to RLA matters because high amperage can reveal overload, high head pressure, or a mechanical bind in the compressor. Current draw is a direct indicator of loading. It does not relate to refrigerant type, drain slope, or be unrelated to loading.

89. A — The low-pressure control protects the compressor from operating at unsafely low suction pressures, which indicate loss of charge or restricted flow. Low suction can cause overheating and oil-return problems. It does not guard against high condensing temperature, overvoltage, or reverse rotation.

90. C — A balancing damper is set by measuring airflow in CFM at the diffuser until the design value is reached. Airflow measurement confirms correct balancing. Subcooling, line voltage, and discharge pressure are unrelated to air balancing.

91. A — Temperature-glide blends must be charged in the liquid phase to maintain the correct blend composition, because the components evaporate at different rates. Vapour charging would fractionate the blend and shift its composition. Liquid charging preserves the intended mix.

92. B — On a fixed-orifice (non-TXV) system, charge is confirmed using superheat with the manufacturer's charging chart referenced to indoor and outdoor conditions. Fixed orifices do not control superheat, so it becomes the charging indicator. Subcooling is the primary method on TXV systems instead.

93. C — Pouring water into the pan confirms the trap and drain line carry water away without backing up, verifying proper condensate drainage at commissioning. A blocked trap or drain shows up immediately. This test checks drainage, not charge, supply temperature, or thermostat settings.

94. C — The defrost cycle's primary goal is to remove ice accumulation from the evaporator coil so it can maintain airflow and heat transfer. Iced coils lose capacity. Defrost does not increase capacity at startup, recover refrigerant, or lower suction pressure as its purpose.

95. D — A high-pressure cutout is verified by simulating or inducing high pressure (for example by restricting condenser airflow) to confirm it trips at its setpoint. This proves the safety functions correctly. Reducing charge or disconnecting wiring does not test the actual trip point.

96. C — Recording baseline pressures, temperatures, and amperages at commissioning provides a reference for diagnosing future performance changes. Technicians compare later readings to the baseline. This documentation supports service, not warranty colour coding, resale value, or brazing.

97. A — Correct multi-stage operation is confirmed when each stage energizes in sequence as the cooling load increases. Sequential staging matches capacity to demand. Simultaneous, random, or single-stage-only operation indicates a staging fault.

98. A — A dirty condenser coil restricts heat rejection, directly raising head pressure and reducing efficiency. The compressor works harder against the higher discharge pressure. This produces high head pressure, not low head or reduced suction symptoms.

99. B — Suction-line frosting back to the compressor signals a low-load or overfeeding condition flooding liquid into the suction line. The unboiled liquid chills the line below freezing. Excessive condenser fan speed, an open cutout, or crankcase-heater current would not cause this floodback.

100. B — Glazed, cracked belts must be replaced, and the sheave alignment and tension checked at the same time. Belt dressing and over-tightening only mask the problem and cause new wear. Proper replacement and alignment restore reliable, efficient drive.

101. A — Environmental regulations require refrigerant to be recovered into an approved cylinder; venting to atmosphere is prohibited. This applies regardless of quantity. Mixing refrigerant types or any deliberate release violates recovery rules and harms the environment.

102. B — A grounded winding found on a megohmmeter test means the motor insulation has broken down to the shell, so the hermetic compressor must be replaced. The short to ground cannot be repaired in a sealed compressor. It is not a charge, capacitor, or normal-condition indication.

103. A — A TXV that has lost its bulb charge cannot open, so the valve closes and starves the evaporator of refrigerant. Loss of the sensing pressure removes the opening force. The result is starvation and high superheat, not flooding or low head pressure.

104. D — A run capacitor reading far below rated microfarads provides insufficient phase shift, so the motor may fail to start or run with reduced torque. The capacitor is essential for proper motor operation. A weak capacitor degrades performance rather than speeding the motor or having no effect.

105. A — Non-condensable gases such as air raise the head pressure above what the condensing temperature alone would produce, because the air occupies condenser volume and adds partial pressure. This shows as abnormally high head pressure. It does not lower head pressure or create a high-side vacuum.

106. A — Pitted, burned contactor contacts should be addressed by replacing the contactor, not filing the contacts. Filing removes the plating and shortens life, and the contactor is a low-cost wear item. Replacement restores reliable, low-resistance switching.

107. C — An open internal overload on a hermetic compressor is confirmed with power off by checking resistance (continuity) across the motor terminals with a meter. An open reading where continuity is expected indicates the overload has tripped or failed open. Pressure, vacuum, and subcooling tests do not assess winding continuity.

108. C — Condensate pans and traps are cleaned to prevent microbial growth, blockages, and water overflow that cause damage and air-quality problems. Standing water breeds slime and algae that clog drains. This maintenance does not affect subcooling, suction pressure, or compressor amperage.

109. A — Normal subcooling with high superheat and low suction pressure points to a restriction such as a clogged filter drier or starved TXV. The restriction limits refrigerant reaching the evaporator while the condenser charge stays normal. An overcharge or failed condenser fan would show different signatures.

110. D — A three-phase motor that hums but will not start with one leg showing no current is single-phasing, typically from a blown fuse or open leg. Loss of one phase removes starting torque. The cause is electrical phase loss, not charge, condensate, or crankcase heating.

111. C — A glide blend must be drawn from the cylinder as liquid, usually through a metering valve, to preserve the blend composition. Removing vapour would change the proportion of components remaining. Liquid removal keeps the charge composition correct.

112. A — With airflow confirmed adequate, a coil that ices over most likely has a low refrigerant charge driving the coil temperature below freezing. Low charge lowers evaporator pressure and temperature. An overcharge, failed crankcase heater, or blocked drain would not freeze the coil this way.

113. D — An electronic leak detector calibrated for the refrigerant is the most sensitive method for finding small leaks. It detects trace concentrations beyond what sight, sound, or bubbles reveal. The other methods only catch larger, accessible leaks.

114. D — A filter drier is replaced after opening a sealed system because the old drier may be saturated and can no longer protect against moisture and acids. A spent drier offers no protection and can release contaminants. A fresh drier safeguards the repaired system.

115. C — A heat pump stuck in defrost should have its defrost control board and termination sensor checked first, since these govern entering and exiting defrost. A failed sensor or board prevents normal termination. The blower capacitor, sight glass, and drain float are unrelated to defrost control.

116. A — Installing an oversized (larger-diameter) drive pulley raises blower speed, increasing airflow and motor amperage draw. More air moved means more work and current. It does not decrease airflow, leave it unchanged, or reverse direction.

117. C — Oil logging in an evaporator indicates poor oil return, commonly from low refrigerant velocity or improper piping. The oil collects instead of returning to the compressor. It is not caused by excess subcooling, normal condenser heat rejection, or a high cutout setting.

118. B — An overfilled recovery cylinder leaves no vapour space, so thermal expansion of the liquid can cause a dangerous hydrostatic rupture. Cylinders are filled only to a safe percentage to allow expansion room. Overfilling is a serious safety hazard, not a benefit.

119. A — A compressor cycling repeatedly on its internal overload, once high head is ruled out, should be checked for low voltage, a failed capacitor, or a mechanical bind. These overload the motor and trip the protector. Insulation colour, drain slope, and cylinder branding are irrelevant to the fault.

120. D — Checking both superheat and subcooling together isolates whether a problem is one of charge or of metering, because each reading reflects a different part of the cycle. Superheat reflects evaporator feed and subcooling reflects condenser liquid. Used together they pinpoint the fault rather than guessing from one value.

121. A — Servicing an A2L flammable refrigerant requires eliminating ignition sources and ensuring adequate ventilation to prevent ignition of any leaked gas. Mild flammability still poses a real risk. Standard precautions and open-flame brazing near the charge port are not acceptable shortcuts.

122. C — A hot, discoloured discharge line with a burnt odour indicates excessive discharge temperature, often from a low charge or a restriction. High discharge heat degrades oil and refrigerant. This is a fault, not normal operation or a minor charge dip.

123. D — Cooling-tower and condenser-water maintenance centres on controlling scale, corrosion, and biological growth in the loop. Untreated water fouls heat-transfer surfaces and promotes Legionella. Raising condensing temperature, cutting tower airflow, or eliminating makeup water are not treatment goals.

124. A — A system that has lost its full charge must be pressure-tested with nitrogen to locate and repair the leak, then evacuated before recharging. Recharging without finding the leak wastes refrigerant and violates good practice. Locate, repair, evacuate, then charge is the correct sequence.

125. C — For refrigerant compliance, the most important record is the type and quantity of refrigerant added or recovered during the service call. This documentation supports regulatory tracking and leak management. Cabinet colour, tool brand, and parking-lot temperature are not compliance data.