PRACTICE EXAM 18: RACM RED SEAL SIMULATION (125 QUESTIONS)

1. A technician must enter a mechanical room where an ammonia refrigeration leak is suspected. Following confined-space and refrigerant safety practice, what is the first action before entry?

A. Enter quickly while holding a breath to locate the leak source

B. Ventilate the space and test the atmosphere with a calibrated monitor

C. Begin repairs immediately since ammonia has a strong warning odour

D. Switch on all lighting and start brazing the suspected joint

2. Which element is required on a WHMIS 2015 supplier label for a container of refrigerant compressor oil?

A. The retail price and the manufacturer's yearly sales totals

B. The technician's name and the date the seal was first broken

C. A record of every previous purchaser of that product

D. A hazard pictogram, a signal word, and hazard statements

3. Earmuffs rated NRR 27 are selected for work beside a noisy condensing unit. What does the NRR value represent?

A. The estimated noise reduction the protector provides to the wearer

B. The loudest sound the earmuffs themselves are able to generate

C. The number of shift hours the muffs may legally be worn

D. The electrical insulation rating of the muff cushions

4. Two technicians lift a heavy compressor onto a curb. Which manual-handling technique reduces back-injury risk?

A. Hold the load away from the body to keep clothing clear

B. Lift rapidly with the arms straight and the knees locked

C. Keep the load close to the body and lift using the legs

D. Twist at the waist while the legs remain straight and rigid

5. During a toolbox talk, a journeyperson explains a hazard to an apprentice. Which approach best supports effective mentoring?

A. State the instruction once quickly and assume understanding

B. Hand over written notes only and skip any spoken discussion

C. Demonstrate the task, then have the apprentice explain it back

D. Direct the apprentice to view a training video after the shift

6. A technician must measure the inside diameter of a copper fitting to within 0.01 mm. Which instrument suits this task?

A. A vernier or digital caliper used on its inside jaws

B. A steel tape measure read to the nearest millimetre

C. A framing square laid across the open fitting end

D. A torque wrench preset to the fitting's tightening value

7. When servicing a system charged with an A2L (mildly flammable) refrigerant, which practice reduces ignition risk?

A. Confirm the refrigerant type using a lit halide torch

B. Use spark-resistant tools and remove ignition sources

C. Operate a standard corded drill next to the open port

D. Permit smoking only on the downwind side of the unit

8. A multi-day rooftop installation must be sequenced. What is the best work-organization practice?

A. Assign tasks randomly to whoever arrives on site first

B. Begin brazing before refrigerant and materials are confirmed

C. Leave all documentation until the system is fully operating

D. Plan material staging and identify critical-path tasks in advance

9. A shop extension cord is found with exposed conductors. What is the correct action?

A. Remove it from service and tag it so it cannot be used

B. Wrap the bare section in electrical tape and continue using it

C. Coil it and return it to storage with the serviceable cords

D. Restrict it to low-amperage loads until a replacement arrives

10. Which Safety Data Sheet section lists first-aid measures for a brazing flux?

A. Section 1 — product and supplier identification

B. Section 9 — physical and chemical properties

C. Section 4 — first-aid measures for exposure

D. Section 14 — transport and shipping information

11. A technician must explain a system fault to a customer with no trade background. What is most professional?

A. Decline to explain because the customer is not a tradesperson

B. Use rapid technical jargon to display trade knowledge

C. Hand over only the invoice without describing the problem

D. Explain the fault in plain language and outline repair options

12. Before each use of a respirator for refrigerant oil mist, the technician must do what?

A. Replace every filter regardless of its condition or history

B. Perform a user seal check to confirm a proper face fit

C. Boil the facepiece for ten minutes to sterilize it fully

D. Remove the exhalation valve to improve breathing airflow

13. What is the correct setup angle for a straight or extension ladder accessing a rooftop?

A. About 1 unit out from the base for every 4 units of height

B. About 2 units out from the base for every 1 unit of height

C. Set vertical against the wall with no base offset

D. About 3 units out from the base for every 1 unit of height

14. A technician prepares a work site inside an occupied office. Which step best protects occupants and finishes?

A. Begin cutting pipe at once to stay ahead of the schedule

B. Leave tools and debris in the main walkway between rooms

C. Set up barriers and protect surfaces before starting work

D. Disable the building fire alarm for the entire job duration

15. Before brazing close to a ceiling tile and sprinkler head, what site-preparation step is required?

A. Raise the brazing temperature to complete the joint faster

B. Use a heat shield and stage a fire extinguisher nearby

C. Spray water on the sprinkler head to keep it cool

D. Remove the ceiling tiles and leave them outdoors overnight

16. A section of refrigerant piping must be isolated for service. What is the correct procedure?

A. Cut the line open first and then close the service valves

B. Vent the refrigerant to atmosphere to depressurize quickly

C. Heat the line with a torch to drive the refrigerant out

D. Recover the refrigerant, then isolate the section with valves

17. Which method cuts copper tubing with the cleanest result and least debris?

A. A tubing cutter rotated progressively around the pipe

B. A hacksaw run quickly with no deburring afterward

C. A hand torch melted through the tube wall

D. Side-cutting pliers used to crush the tube closed

18. Why is reaming a freshly cut copper tube important before assembly?

A. It enlarges the outside diameter for a tighter joint

B. It anneals the copper so it bends more easily

C. It removes the internal burr that would restrict flow and cause turbulence

D. It cleans the outer surface in preparation for painting

19. Which tool bends soft copper tubing without kinking it?

A. A pipe wrench applied directly across the bend

B. A spring-type or lever-type bender sized to the tube

C. A propane torch to soften the full length first

D. A bench vise clamped tightly at the bend centre

20. What is the correct practice for labelling refrigerant cylinders in storage?

A. Leave them unmarked since colour alone identifies contents

B. Combine recovered refrigerants into one cylinder to save room

C. Store full and empty cylinders together without markings

D. Mark each cylinder clearly with its refrigerant type and status

21. Soft soldering joins copper lines on a chilled-water system. Which flux property is desirable?

A. It removes oxides and lets the solder flow and wet the joint

B. It ignites readily to preheat the joint area faster

C. It leaves a thick insulating residue inside the joint

D. It raises the melting point of the filler metal used

22. Why is dry nitrogen flowed through tubing during brazing of refrigerant lines?

A. To raise pressure so the joint forms more quickly

B. To cool the copper and prevent it from annealing

C. To prevent oxidation and scale forming inside the tube

D. To add moisture that helps the filler metal flow

23. A routine task is hampered by poor lighting in the work area. What is the appropriate response?

A. Continue working from memory of the layout instead

B. Provide adequate temporary task lighting before proceeding

C. Hold a phone screen in the mouth as a light source

D. Postpone the work hoping for better natural light tomorrow

24. What ensures a leak-free flare joint on a small copper line?

A. A flare cracked slightly so refrigerant can seat it

B. A flare formed on hardened copper with no annealing

C. A flare tightened well beyond the specified torque

D. A properly formed flare with the correct angle and a smooth face

25. What is the purpose of swaging when joining two copper tubes of equal diameter?

A. To expand one tube end so the other slides inside it

B. To reduce the diameter so a smaller fitting can be used

C. To work-harden the joint so no filler metal is needed

D. To form a seat for a mechanical compression fitting

26. What is the main consideration when selecting pipe hangers for horizontal refrigerant lines?

A. Choosing the cheapest hanger regardless of pipe size

B. Spacing them as far apart as possible to cut material cost

C. Support spacing and material suited to pipe size and weight

D. Selecting hangers that permit the greatest possible pipe sag

27. How should a copper line passing through a metal stud be protected?

A. Use a grommet or sleeve to prevent abrasion at the contact point

B. Leave the line in direct contact with the sharp metal edge

C. Fill the entire stud cavity with expanding foam around it

D. Solder the line permanently to the steel stud for support

28. Why must refrigerant quantities added to a system be recorded accurately?

A. Only to estimate the technician's labour hours on the job

B. To decide what colour the cylinder should be painted

C. Because the refrigerant changes type once it is recorded

D. For regulatory compliance and leak-tracking of the system

29. When staging materials for a routine install, deliveries should be checked against which document?

A. A blank inspection report not yet completed

B. The bill of materials or material take-off list for the job

C. Last year's completed warranty claim form

D. The supply house staff's personal phone contacts

30. What is the correct preparation of a copper joint surface before brazing?

A. Leave the oxide layer to help the filler metal bond

B. Apply oil to lubricate the filler metal flow

C. Wet the joint with water just before heating

D. Abrade the surfaces to bright clean metal and remove residue

31. Why should cylinder colour not be the sole means of identifying a refrigerant?

A. Because colour standards have changed and labels must be verified

B. Because the colour sets the refrigerant's pressure rating

C. Because cylinders are never painted any colour

D. Because colour coding has always been perfectly standardized

32. After completing a routine service, what is good practice when handing the site back?

A. Leave packaging and offcuts for the customer to dispose of

B. Leave the access panels off so the customer can inspect

C. Clean the work area and remove all debris and waste

D. Depart without telling anyone the work is finished

33. A technician sizes refrigerant piping for a split system. What happens if the suction line is undersized?

A. Oil return improves because velocity drops in the line

B. Excessive pressure drop reduces capacity and raises compressor work

C. Subcooling increases at the condenser outlet automatically

D. The system requires far less refrigerant charge overall

34. When planning a condensate drain for a cooling coil, why is a trap installed in the drain line?

A. To filter particulate from the condensate before it drains

B. To raise the condensate temperature before discharge

C. To increase the static pressure across the cooling coil

D. To prevent air being drawn in or pushed out through the drain

35. A heat-load calculation is performed for a walk-in cooler. Which factor must be included?

A. Product load, transmission, infiltration, and internal loads

B. Only the floor area of the cooler in square metres

C. Only the outdoor design temperature at the location

D. Only the wattage rating of the evaporator fan motors

36. When planning the installation of a control system, what does a sequence of operation describe?

A. The physical pipe routing between indoor and outdoor units

B. The refrigerant charge weight required for the system

C. The order and conditions under which components are energized

D. The colour code used for the low-voltage control wiring

37. A liquid line is planned to rise vertically several metres to an upper floor. What design concern does this create?

A. The line must be insulated only at the very top elevation

B. Static head from the lift reduces pressure and can cause flash gas

C. The vertical rise has no effect on liquid line performance

D. The liquid will sub-cool more as it rises against gravity

38. Planning a duct system, a technician must account for friction loss. What does friction loss represent?

A. The pressure drop as air moves through the duct and fittings

B. The heat gained by the air from the surrounding space

C. The volume of air leaking out through duct seams

D. The electrical load drawn by the supply fan motor

39. When planning refrigerant line routing, why are excessive 90-degree elbows avoided?

A. They improve oil return by speeding the refrigerant up

B. They reduce the total refrigerant charge needed

C. They make the system quieter during compressor operation

D. Each fitting adds pressure drop equivalent to added pipe length

40. A technician plans the location of a condensing unit outdoors. Which placement consideration is most important?

A. Positioning it where snow drifts collect against the coil

B. Allowing clearance for airflow and service access around it

C. Placing it as close to a bedroom window as possible

D. Mounting it directly on soft soil without any pad

41. When planning control wiring for a thermostat, why is wire gauge selected based on length and current?

A. Larger gauge always lowers the system's refrigerant charge

B. Gauge has no effect on a low-voltage control circuit

C. Undersized wire causes voltage drop and unreliable operation

D. Smaller gauge increases the control transformer's output voltage

42. A technician plans an evaporator selection for a medium-temperature application. Which coil characteristic matters most?

A. The TD (temperature difference) matched to the product and humidity needs

B. The exterior paint colour chosen for the coil casing

C. The brand name printed on the coil nameplate

D. The shipping weight of the coil in its packaging

43. Planning a system using a thermostatic expansion valve (TXV), what does the valve primarily control?

A. The condenser fan speed during high ambient conditions

B. The compressor's electrical inrush current at startup

C. The high-side discharge pressure during operation

D. Refrigerant flow into the evaporator to maintain superheat

44. When planning the installation, why must a technician verify the available electrical supply?

A. To choose the paint colour for the disconnect enclosure

B. To confirm voltage and phase match the equipment requirements

C. To set the refrigerant subcooling target at the condenser

D. To decide how many ceiling tiles to remove for access

45. A technician plans pipe insulation for a suction line. What is the primary purpose of the insulation?

A. To prevent heat gain and surface condensation on the line

B. To increase the refrigerant velocity inside the tube

C. To raise the suction pressure entering the compressor

D. To add structural strength so fewer hangers are needed

46. Planning a rooftop unit installation, why is the curb important?

A. It increases the unit's refrigerant holding capacity

B. It serves as the electrical ground for the whole unit

C. It supports the unit, provides a weather seal, and routes ducts

D. It replaces the need for any vibration isolation entirely

47. When planning a chilled-water piping layout, why are air vents installed at system high points?

A. To inject refrigerant into the chilled-water loop

B. To increase the water flow rate through the pump

C. To drain the entire system for winter shutdown

D. To release trapped air that would impede water circulation

48. A technician plans the refrigerant type for a new low-temperature system. Which factor drives the selection?

A. The colour the customer prefers for the cylinders

B. Operating temperature range, efficiency, and regulatory status

C. The brand of recovery machine available in the shop

D. The length of the longest copper run on the site

49. When sizing a circuit for a packaged unit, what does the nameplate MCA value specify?

A. The maximum refrigerant charge the unit may hold

B. The minimum duct size required for the supply air

C. The minimum circuit ampacity the conductors must carry

D. The maximum allowable suction line temperature

50. Planning an installation in a seismic zone, what additional consideration applies?

A. Equipment and piping require restraint and bracing for movement

B. The refrigerant must be changed to a non-flammable type

C. No special consideration is needed for refrigeration equipment

D. The system must operate at a higher condensing pressure

51. During installation, a technician pressure-tests a new refrigerant circuit. Which gas is appropriate for the strength and leak test?

A. Oxygen-free dry nitrogen brought to the specified test pressure

B. Pure oxygen because it is readily available on most sites

C. The system refrigerant released directly from the cylinder

D. Compressed shop air containing ambient moisture and oil

52. After leak testing, the technician evacuates the system. What is the purpose of evacuation?

A. To pressurize the system above its normal operating range

B. To add lubricating oil to the compressor crankcase

C. To remove air and moisture down to a deep vacuum level

D. To set the superheat at the expansion valve outlet

53. A micron gauge is used during evacuation. A deep vacuum that holds steady after isolating the pump indicates what?

A. The system still contains a large refrigerant charge

B. The vacuum pump oil must be changed immediately

C. The compressor is running at excessive discharge pressure

D. The system is dry and tight with no significant leak or moisture

54. When installing a TXV, where must the sensing bulb be mounted?

A. On the liquid line just after the receiver outlet

B. Clamped to a clean horizontal suction line near the evaporator outlet

C. Inside the evaporator coil among the return bends

D. On the compressor discharge line close to the service valve

55. During installation of copper lines, the technician brazes joints while flowing nitrogen. What defect does this prevent inside the tube?

A. Formation of copper oxide scale that can contaminate the system

B. Over-tightening of the mechanical flare connections

C. Excessive subcooling at the condenser outlet

D. An increase in the system's total refrigerant charge

56. When charging a system with a blended (zeotropic) refrigerant, how should it be removed from the cylinder?

A. As vapour from the top to avoid disturbing the blend

B. Only after warming the cylinder in hot water above 60°C

C. By venting a portion first to purge the cylinder valve

D. As liquid, since the blend can fractionate if charged as vapour

57. During installation, the technician must support a long horizontal suction line. What does inadequate support risk?

A. The line will raise the system's subcooling automatically

B. The refrigerant charge will decrease over time on its own

C. Sagging that traps oil and stresses the brazed joints

D. The suction pressure will rise above the design point

58. When connecting electrical power to a three-phase compressor, why is rotation direction verified?

A. To set the thermostatic expansion valve superheat

B. A scroll or screw compressor can be damaged running in reverse

C. To increase the refrigerant charge needed for the system

D. Reverse rotation has no effect on any compressor type

59. A technician installs a filter-drier in the liquid line. What is its primary function?

A. To remove moisture and filter particulate from the refrigerant

B. To increase the refrigerant velocity into the evaporator

C. To raise the high-side pressure for better condensing

D. To act as the metering device in place of a TXV

60. During installation of ductwork, why are flexible connectors used at the air handler?

A. To increase the static pressure delivered by the fan

B. To act as the primary support for the duct weight

C. To reduce transmission of fan vibration into the ductwork

D. To filter particulate from the supply air stream

61. When installing a condensate pump for a high-wall split unit, what must be verified?

A. The pump discharges into the suction line of the system

B. The pump runs continuously regardless of water level

C. The pump is wired to the refrigerant high-pressure switch

D. The safety switch interrupts cooling if the pump fails

62. A technician installs service valves on a new condensing unit. Why are access ports important?

A. They serve as the structural mount for the compressor

B. They allow connection of gauges for charging and diagnostics

C. They replace the need for a liquid line filter-drier

D. They function as the system's metering device

63. During installation, refrigerant lines must penetrate a fire-rated wall. What is required at the penetration?

A. An approved firestop system maintaining the wall's fire rating

B. The lines left loose in an oversized open hole

C. The insulation removed where the line passes through

D. The penetration sealed with ordinary duct tape only

64. A technician installs a low-ambient control on an air-cooled condenser. What does it accomplish?

A. It raises the evaporator superheat in cold weather

B. It increases the compressor oil charge during winter

C. It prevents the system from operating below freezing entirely

D. It maintains adequate head pressure in cold outdoor conditions

65. When installing refrigerant piping, why is a P-trap formed at the base of a suction riser?

A. To drain condensate from the supply air duct

B. To increase the refrigerant subcooling on the riser

C. To aid oil return up the vertical riser to the compressor

D. To act as a metering device feeding the evaporator

66. During installation, a technician torques flare nuts to specification. Why is correct torque important?

A. Under- or over-torquing can cause leaks or crack the flare

B. Torque value sets the system's operating superheat

C. Higher torque always increases the system efficiency

D. Torque has no measurable effect on a flare connection

67. When installing a packaged rooftop unit, why must the condensate drain slope correctly?

A. To increase the airflow across the evaporator coil

B. To ensure condensate flows away and does not pool in the pan

C. To raise the refrigerant charge held in the system

D. To reduce the electrical load on the supply fan motor

68. A technician commissions wiring for a 24-volt control circuit. What component steps the supply voltage down to 24 V?

A. The compressor contactor coil winding

B. The defrost termination thermostat

C. The control transformer in the equipment

D. The crankcase heater on the compressor

69. During installation, why is the refrigerant charge weighed in rather than guessed?

A. Because weighing changes the refrigerant to a safer type

B. Because the cylinder colour requires a measured amount

C. Because weighing reduces the suction line pressure drop

D. To match the manufacturer's specified charge accurately

70. When installing equipment requiring vibration isolation, what is the typical method?

A. Spring or pad isolators between the equipment and the structure

B. Bolting the equipment rigidly directly to the steel structure

C. Resting the equipment loosely on the bare concrete floor

D. Suspending the equipment from the refrigerant piping alone

71. A technician installs an accumulator on a heat pump suction line. What does it protect against?

A. Excessive subcooling at the condenser during heating

B. High discharge temperature during the defrost cycle

C. Liquid refrigerant slugging returning to the compressor

D. Low static pressure in the supply air ductwork

72. During installation, why must dissimilar metals at a joint be considered?

A. Dissimilar metals always braze more easily together

B. Galvanic corrosion can occur where dissimilar metals contact

C. Dissimilar metals raise the refrigerant's boiling point

D. The metal type sets the required superheat value

73. When installing a reversing valve on a heat pump, what determines its position in the circuit?

A. It is mounted only on the liquid line near the receiver

B. It is installed inside the evaporator coil casing

C. Its orientation has no effect on the system operation

D. It directs refrigerant flow to switch between heating and cooling

74. A technician installs sight glasses in a liquid line. What does bubbling in the sight glass during steady operation typically indicate?

A. A low refrigerant charge or restriction causing flash gas

B. The system is correctly charged and fully subcooled

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

D. The condenser fan is running at an excessive speed

75. During the installation of control sensors, why must a temperature sensor make good thermal contact with the pipe?

A. Poor contact has no effect on the sensor reading

B. Poor contact gives an inaccurate reading and faulty control

C. Good contact increases the refrigerant charge in the line

D. Good contact lowers the control circuit voltage requirement

76. When commissioning the refrigerant piping after installation, what confirms the joints are leak-free before charging?

A. A visual check of the joint colour is sufficient on its own

B. Running the compressor briefly to pressurize the joints

C. Adding refrigerant first and watching for a pressure rise

D. A standing pressure test with nitrogen and a leak-detection method

77. A technician commissions a system and measures evaporator superheat. Superheat is best defined as which of the following?

A. The pressure difference between the suction and discharge sides

B. The temperature of the vapour above its saturation temperature at that pressure

C. The temperature of the liquid below its saturation temperature

D. The total refrigerant charge expressed in degrees of temperature

78. During commissioning, a technician measures subcooling at the condenser outlet. Subcooling is calculated how?

A. Saturated condensing temperature minus the measured liquid line temperature

B. Measured suction temperature minus the saturated evaporating temperature

C. Discharge pressure minus the suction pressure converted to temperature

D. Liquid line temperature minus the ambient outdoor air temperature

79. A commissioning technician finds superheat is very low and frost is forming on the suction line. What does this most likely indicate?

A. The system is undercharged and starved of refrigerant

B. The condenser fan has failed and head pressure is high

C. The TXV is overfeeding and liquid is flooding the evaporator

D. The filter-drier is fully plugged and restricting liquid flow

80. During commissioning, the measured superheat is much higher than the target value. Which condition is consistent with this reading?

A. The evaporator is flooded with excess liquid refrigerant

B. The condenser is heavily oversized for the application

C. The compressor is running in reverse rotation

D. The system is undercharged or the metering device is underfeeding

81. A technician sets the airflow on a cooling coil during commissioning. If airflow is too low across the evaporator, what typically results?

A. Coil temperature drops, raising the risk of icing on the coil

B. The condensing pressure falls well below normal range

C. The compressor draws no current during operation

D. The subcooling at the condenser becomes negative

82. During commissioning, a technician measures a 20°C temperature rise across an electric duct heater of known kilowatt output to verify airflow. Which relationship is used to calculate the airflow?

A. Airflow equals the duct cross-sectional area divided by the velocity pressure

B. Airflow equals the heater kilowatts divided by the measured static pressure

C. Airflow is found from the heater output, the temperature rise, and a sensible heat constant

D. Airflow equals the refrigerant mass flow multiplied by the latent heat of vaporization

83. A technician commissions a TXV-controlled system and adjusts the valve. Turning the adjustment stem to increase spring pressure does what to superheat?

A. It has no effect on the measured superheat at all

B. It increases the superheat setting of the valve

C. It converts the valve to a fixed-orifice metering device

D. It lowers the condensing pressure on the high side

84. During commissioning, the technician records pressures and temperatures on a log. Why is this baseline documentation valuable?

A. It determines the colour code for the system's wiring

B. It sets the refrigerant type used to charge the system

C. It eliminates the need for any future maintenance visits

D. It provides a reference for diagnosing future performance changes

85. A commissioning technician verifies the operation of a high-pressure safety control. What should this control do when its setpoint is reached?

A. Open the circuit to stop the compressor and prevent overpressure

B. Increase the condenser fan speed to lower the head pressure

C. Open the expansion valve fully to relieve the high side

D. Add refrigerant automatically to balance the system pressure

86. During commissioning of an air system, a technician balances the supply registers. What is the goal of air balancing?

A. To raise the refrigerant subcooling at the condenser

B. To increase the total static pressure in the main duct

C. To deliver the design airflow to each zone or space

D. To reduce the electrical phase imbalance at the panel

87. A technician commissions a system using a blended refrigerant and must check pressures. Why is a pressure-temperature chart for that specific blend required?

A. Because all refrigerants share one universal P-T relationship

B. Because the chart sets the electrical supply voltage needed

C. Because blends have no usable pressure-temperature relationship

D. Because each refrigerant has its own unique pressure-temperature relationship

88. During commissioning, a technician confirms the defrost cycle on a low-temperature evaporator. What initiates and terminates a typical electric defrost cycle?

A. The compressor discharge pressure rising above a fixed limit

B. A timer or demand control to start, and temperature or time to end

C. The condenser fan cycling on the outdoor ambient sensor

D. The liquid line sight glass clearing of all bubbles

89. A commissioning technician checks compressor current against the nameplate RLA. A reading well above RLA suggests what?

A. An overloaded compressor, possibly from high head pressure

B. The system is overcharged with lubricating oil only

C. The evaporator superheat is set too high to read current

D. The control transformer is supplying excess voltage

90. During commissioning, the technician verifies condenser airflow. Restricted condenser airflow most directly causes what?

A. Lower-than-normal suction pressure and frosting

B. A reduced refrigerant charge requirement overall

C. Elevated head pressure and higher compressor load

D. Negative subcooling at the condenser outlet

91. A technician commissions a chilled-water coil and bleeds the air from it. Why is removing trapped air important?

A. Trapped air increases the refrigerant charge in the loop

B. Air pockets reduce heat transfer and impede water flow

C. Trapped air raises the chilled-water supply temperature setpoint

D. Air improves circulation and is left in the coil deliberately

92. During commissioning, a technician sets the anti-short-cycle timer on a control. What does this timer protect against?

A. Excessive subcooling building at the condenser outlet

B. Air being trapped at the high points of the piping

C. Low refrigerant velocity in the horizontal suction lines

D. Rapid compressor restarts that can overload the motor

93. A commissioning check shows the liquid line sight glass is clear and subcooling is within range. What does this indicate?

A. The charge appears adequate with solid liquid feeding the metering device

B. The system is severely undercharged and starving the evaporator

C. The compressor is operating in reverse rotation

D. The condenser fan motor has failed completely

94. During commissioning of a control system, why is the sequence of operation tested step by step?

A. To determine the refrigerant charge weight for the system

B. To select the proper paint colour for the control panel

C. To verify each component energizes correctly in the right order

D. To set the flare-nut torque on the refrigerant connections

95. A technician commissions a heat pump and tests the reversing valve in both modes. What confirms correct operation?

A. The suction pressure stays identical in heating and cooling

B. The flow switches direction and the modes change as commanded

C. The compressor stops whenever the valve is energized

D. The condenser fan reverses its rotation in heating mode

96. During commissioning, a technician measures the wet-bulb and dry-bulb temperatures of supply air. What property is being determined?

A. The relative humidity and moisture content of the air

B. The static pressure delivered by the supply fan

C. The refrigerant superheat at the evaporator outlet

D. The electrical power factor of the fan motor circuit

97. A commissioning technician verifies that an economizer dampers modulate correctly. What is the economizer's purpose?

A. To raise the refrigerant subcooling during peak load

B. To increase the compressor's discharge pressure on demand

C. To weigh the refrigerant charge into the system precisely

D. To use cool outdoor air for free cooling when conditions allow

98. A service technician finds a system that is short on capacity with high superheat and low subcooling. Which diagnosis is most consistent?

A. The system is overcharged with refrigerant

B. The system is undercharged with refrigerant

C. The condenser fan is running in reverse

D. The evaporator is flooded with liquid refrigerant

99. During service, a compressor is found tripping on its overload repeatedly. Which cause should be investigated first?

A. The presence of subcooling at the condenser outlet

B. A clean and unobstructed evaporator coil surface

C. High head pressure from a dirty condenser or low airflow

D. A correctly sized and fully charged refrigerant system

100. A technician services a system and must recover the refrigerant. Under environmental regulations, venting refrigerant to atmosphere is treated how?

A. Prohibited; refrigerant must be recovered into approved cylinders

B. Permitted whenever the charge is below one kilogram

C. Allowed if the refrigerant is a natural substance

D. Required as the fastest way to empty the system

generate the correct question and answer3:52 PM⇆・・・Claude responded: 101.101. During maintenance on a residential cooling system operating at normal indoor humidity, a technician measures the dry-bulb temperature of the return air and the supply air. What is the approximate temperature drop across a properly operating evaporator coil?

A. About 1 to 3°C between return and supply air

B. About 25 to 30°C between return and supply air

C. About 8 to 12°C between return and supply air

D. About 40 to 45°C between return and supply air

102. A service call reveals an iced-up evaporator on an air system. Which cause is most likely?

A. Low airflow from a dirty filter or failed blower motor

B. Excessive condenser airflow during the cooling cycle

C. The refrigerant charge is far above the design weight

D. The thermostat setpoint is far too high for the space

103. During servicing, a technician must replace a liquid line filter-drier. Why is the system recovered first?

A. Recovery raises the suction pressure for easier removal

B. Recovery converts the refrigerant to a non-flammable type

C. Recovery changes the cylinder colour to match the drier

D. Recovery prevents refrigerant loss when the line is opened

104. A technician services a system contaminated after a compressor burnout. What component is critical to install during cleanup?

A. A larger condenser fan motor for more airflow

B. A suction-line filter-drier to capture acids and contaminants

C. A second expansion valve in parallel with the first

D. An additional sight glass on the discharge line

105. During maintenance, a technician measures motor winding resistance to ground. A reading near zero ohms to ground indicates what?

A. A grounded winding with failed insulation in the motor

B. A perfectly insulated, healthy motor winding

C. An open winding with no continuity at all

D. A correctly running motor under full load

106. A technician troubleshoots a no-cooling call and finds 24 V at the contactor coil but the contactor not pulling in. What is the likely fault?

A. The thermostat is open and not calling for cooling

B. The supply breaker to the unit has been switched off

C. The contactor coil is open or the contactor has failed

D. The refrigerant charge is slightly below the target weight

107. During service, a technician checks a capacitor on a single-phase motor. A capacitor that has failed open will most likely cause what?

A. The motor to run faster than its rated speed

B. The motor to overcharge the refrigerant circuit

C. The condenser to subcool the refrigerant excessively

D. The motor to hum and fail to start, then trip on overload

108. A technician services a TXV system where the evaporator is starving. After ruling out charge, what should be checked next?

A. The colour of the suction line insulation

B. The TXV, sensing bulb, and any liquid line restriction

C. The condenser fan blade pitch and direction

D. The duct static pressure at the supply register

109. During maintenance, a technician performs an acid test on the refrigerant oil. A positive acid test indicates what?

A. System contamination, often associated with overheating or a burnout

B. The refrigerant charge is correctly within specification

C. The oil is fresh and suitable for continued service

D. The condenser airflow is operating at the design rate

110. A service technician finds a heat pump that heats poorly in cold weather with the auxiliary heat running constantly. Which fault should be checked?

A. The economizer dampers stuck fully closed in summer

B. The chilled-water pump cavitating at the high points

C. The condensate trap on the cooling coil being dry

D. A defrost or reversing valve problem, or low refrigerant charge

111. During servicing, a technician must leak-test a system suspected of losing refrigerant. Which method is appropriate?

A. Listening only for an audible hiss near the components

B. Spraying water on every joint and watching for steam

C. Using an electronic detector, bubble solution, or UV dye

D. Adding refrigerant until the leak stops on its own

112. A technician services a walk-in freezer that is not reaching temperature, and the evaporator is heavily frosted. What should be checked first?

A. The defrost system operation and the defrost termination control

B. The colour code of the low-voltage control wiring

C. The static pressure across the supply air ductwork

D. The paint condition on the condensing unit cabinet

113. During maintenance, a technician finds the compressor cycling on the low-pressure control frequently. With a fixed metering device, which cause is plausible?

A. The condenser is heavily oversized for the load

B. Low charge or restricted refrigerant flow lowering suction pressure

C. The high-pressure control set far above the relief setting

D. The supply fan delivering excessive airflow to the space

114. A service technician must check three-phase voltage at a compressor terminal. Why is voltage imbalance between phases a concern?

A. Imbalance raises the refrigerant subcooling automatically

B. Imbalance lowers the system's required charge weight

C. Voltage imbalance causes excessive current and motor overheating

D. Imbalance has no measurable effect on a three-phase motor

115. During service, a technician finds the system has non-condensable gases in it. Where do non-condensable gases typically collect, and what is the effect?

A. In the condenser and high side, raising head pressure abnormally

B. In the compressor crankcase, lowering the oil level over time

C. In the evaporator coil, increasing the system's cooling capacity

D. In the suction line, reducing the measured superheat to zero

116. A technician services a hermetic compressor that will not start and hums briefly before tripping. After checking the capacitor, what else should be tested?

A. The colour of the discharge line insulation

B. The duct static pressure at the return grille

C. The start components, windings, and for a possible seized rotor

D. The slope of the condensate drain line from the coil

117. During maintenance, a technician must adjust the head pressure control on a system in cold weather. What is the control's role?

A. To lower the suction pressure during the defrost cycle

B. To maintain sufficient head pressure for proper TXV operation

C. To increase the evaporator superheat in mild weather

D. To weigh refrigerant into the system during charging

118. A service technician measures a high discharge temperature on a compressor. Which condition can contribute to excessive discharge temperature?

A. Low refrigerant charge or high compression ratio raising the discharge temperature

B. An oversized condenser providing excess subcooling

C. A flooded evaporator returning liquid to the suction line

D. A correctly charged system operating at design conditions

119. During servicing, a technician notes oil staining at a fitting on the refrigerant circuit. What does this oil residue most likely indicate?

A. A refrigerant leak at that joint carrying oil with it

B. The compressor is overcharged with lubricating oil

C. The condenser is operating below its design subcooling

D. The evaporator superheat is set slightly above target

120. A technician services a condenser that is dirty and reduces its capacity. Why must the condenser be kept clean during maintenance?

A. A dirty coil lowers the suction pressure below freezing

B. A dirty coil reduces the system's required refrigerant charge

C. A dirty coil reduces heat rejection and raises head pressure

D. A dirty coil increases the control transformer output voltage

121. During maintenance of a control system, a technician finds a defrost termination thermostat that never opens. What symptom would result?

A. The system would refuse to enter the defrost cycle at all

B. The defrost would run too long, wasting energy and adding heat

C. The compressor would trip immediately on high pressure

D. The evaporator would subcool the liquid line excessively

122. A service technician must determine whether a reversing valve is leaking internally. Which symptom suggests an internally leaking valve?

A. The suction line maintains a perfectly normal temperature

B. The system reaches full capacity faster than normal

C. The condenser fan motor draws no current at all

D. Reduced capacity with the suction line warmer than expected

123. During servicing, a technician must verify a thermistor sensor reading. How is a thermistor typically checked?

A. By measuring its resistance and comparing to a temperature chart

B. By measuring the refrigerant pressure at the sensor location

C. By weighing the refrigerant charge against the sensor value

D. By checking the paint colour coding on the sensor body

124. A technician services a system and must select replacement refrigerant for a retrofit. What is the primary concern in the selection?

A. Matching the cylinder colour to the original refrigerant

B. Choosing whichever refrigerant is cheapest in the shop

C. Compatibility with the oil, materials, and system design

D. Selecting the refrigerant with the longest copper run

125. During a final maintenance check, a technician documents all readings and actions taken. Why is a complete service record important?

A. It establishes a history for warranty, compliance, and future diagnostics

B. It changes the refrigerant type stored in the system

C. It eliminates the need to recover refrigerant in future

D. It sets the supply air static pressure for the building

Practice Exam 18: Answer Key and Explanations

1. B — Ventilate and verify the atmosphere with a calibrated monitor before entry. A suspected refrigerant leak can displace oxygen or reach toxic concentrations, and odour is an unreliable warning. Confirming a safe atmosphere protects against asphyxiation and exposure before any work begins.

2. D — A WHMIS 2015 supplier label must carry a pictogram, signal word, and hazard statements. These standardized elements communicate the product's hazards at a glance to anyone handling it. Consistent labelling lets workers identify dangers and precautions without consulting the full SDS.

3. A — The NRR estimates the noise reduction a hearing protector can provide to the wearer. It is a laboratory-derived rating used to gauge attenuation against measured workplace noise. Real-world protection is usually lower, so the value guides selection rather than guaranteeing exact field results.

4. C — Keep the load close to the body and lift with the legs. This keeps the spine neutral and uses the strong leg muscles instead of the lower back. Reducing the lever arm and avoiding twisting minimizes the risk of disc and muscle injury.

5. C — Demonstrate the task, then have the apprentice explain it back. Confirming understanding through teach-back verifies the learner grasped the hazard rather than passively hearing it. Active feedback is the core of effective on-site mentoring.

6. A — A vernier or digital caliper measures inside diameter accurately to 0.01 mm using its inside jaws. Calipers are designed for precise dimensional readings that a tape or square cannot deliver. Correct measurement ensures the fitting matches the tube for a sound joint.

7. B — Use spark-resistant tools and remove ignition sources when servicing A2L refrigerants. A2L blends are mildly flammable, so eliminating sparks and open flames prevents ignition of any released charge. Controlling ignition sources is the primary safety control for flammable refrigerant work.

8. D — Plan material staging and identify critical-path tasks in advance. Sequencing the work around dependencies prevents idle time and rework on a multi-day job. Good organization keeps crews productive and the schedule on track.

9. A — Remove the damaged cord from service and tag it so it cannot be used. Exposed conductors present a shock and arc hazard that tape cannot reliably make safe. Lockout/tag-out of defective equipment prevents accidental reuse until it is repaired or discarded.

10. C — Section 4 of an SDS lists first-aid measures for exposure. The 16-section SDS format places first-aid information in Section 4 so responders can find it quickly. Knowing the section layout speeds an effective response during an incident.

11. D — Explain the fault in plain language and outline repair options. Clear, jargon-free communication lets the customer make an informed decision and builds trust. Professional service includes translating technical findings into terms the client understands.

12. B — Perform a user seal check before each respirator use to confirm a proper face fit. A leaking seal allows contaminated air to bypass the filter, defeating the protection. The quick check ensures the respirator performs as intended for that wearing.

13. A — Set the ladder roughly 1 unit out from the base for every 4 units of height (the 4:1 rule). This angle balances stability against the wall and prevents the base from sliding out. Correct setup is fundamental to safe ladder access.

14. C — Set up barriers and protect surfaces before starting work in an occupied space. Containment protects occupants and finishes from dust, debris, and hazards. Preparing the site first prevents damage and keeps the area safe during the job.

15. B — Use a heat shield and stage a fire extinguisher nearby before brazing near combustibles. Shielding protects the sprinkler head and ceiling from flame and heat, and a staged extinguisher allows immediate response. Fire prevention is essential whenever an open flame is used indoors.

16. D — Recover the refrigerant, then isolate the section with valves. Recovery prevents venting to atmosphere and removes pressure safely before the line is opened. Isolating with valves confines the work area without losing the system charge.

17. A — A tubing cutter rotated progressively around the pipe gives the cleanest cut with minimal burr. The wheel scores and severs the copper squarely without the debris of a saw. A clean, square cut is essential for proper flares, swages, and brazed joints.

18. C — Reaming removes the internal burr that would otherwise restrict flow and cause turbulence. The raised edge left by cutting reduces the effective bore and disturbs refrigerant or oil flow. Deburring restores full flow area and protects downstream components.

19. B — A spring-type or lever-type bender sized to the tube bends soft copper without kinking. The bender supports the tube wall through the radius so it does not collapse. Proper bending maintains full bore and avoids flow restriction.

20. D — Mark each cylinder clearly with its refrigerant type and status. Labels prevent mixing refrigerants and identify recovered, recovered-full, or virgin contents. Clear marking is both a safety and a regulatory requirement.

21. A — A desirable soldering flux removes oxides and lets the solder flow and wet the joint. Clean, oxide-free surfaces allow capillary action to draw filler into the joint. Proper wetting produces a strong, leak-free connection.

22. C — Flowing dry nitrogen during brazing prevents oxidation and scale inside the tube. Without it, heated copper forms cupric oxide flakes that contaminate the system and clog metering devices. Purging keeps the internal surfaces clean for reliable operation.

23. B — Provide adequate temporary task lighting before proceeding. Poor lighting raises the risk of errors and injury and prevents proper inspection of the work. Correcting the hazard first is the appropriate response.

24. D — A properly formed flare with the correct angle and a smooth face ensures a leak-free joint. The flare must seat fully against the fitting to seal under pressure. Cracks, wrong angles, or over-torque all compromise the seal.

25. A — Swaging expands one tube end so the other slides inside it, forming a joint without a coupling. This creates a brazeable socket between two tubes of equal diameter. It reduces fittings and potential leak points in the line.

26. C — Hanger support spacing and material must suit the pipe size and weight. Correct spacing prevents sagging that traps oil and stresses joints. Appropriate material avoids galvanic issues and supports the load safely.

27. A — Use a grommet or sleeve to prevent abrasion where a copper line passes through a metal stud. Vibration against a sharp edge can wear through the tube and cause a leak. Protecting the contact point preserves the line's integrity.

28. D — Accurate refrigerant records are required for regulatory compliance and leak-tracking. Tracking quantities added over time reveals chronic leaks and satisfies environmental reporting rules. Documentation is a legal and diagnostic necessity.

29. B — Verify deliveries against the bill of materials or material take-off list. This confirms the correct quantities and items arrived before work proceeds. Catching shortages early prevents schedule delays on the install.

30. D — Abrade the joint surfaces to bright clean metal and remove residue before brazing. Oxides and contaminants prevent the filler from wetting and bonding. Clean surfaces are essential for a sound brazed joint.

31. A — Cylinder colour should not be the sole identifier because colour standards have changed and labels must be verified. Reused or relabelled cylinders and revised colour conventions make colour unreliable. The label is the authoritative source of contents.

32. C — Clean the work area and remove all debris and waste when handing the site back. A clean handover is professional, safe, and expected by the customer. Leaving waste behind reflects poorly and can create hazards.

33. B — An undersized suction line causes excessive pressure drop, reducing capacity and raising compressor work. Higher pressure drop lowers suction pressure at the compressor and forces a higher compression ratio. Correct line sizing protects both capacity and efficiency.

34. D — A condensate trap prevents air being drawn in or pushed out through the drain. The trap maintains a water seal against the negative or positive pressure at the drain pan. This ensures condensate flows freely without air bypassing the system.

35. A — A walk-in cooler heat-load calculation must include product, transmission, infiltration, and internal loads. Each contributes heat that the system must remove to hold temperature. Omitting any component undersizes the equipment.

36. C — A sequence of operation describes the order and conditions under which components are energized. It defines how the control system responds to demands and safeties. This logic guides installation, commissioning, and troubleshooting.

37. B — A tall liquid line lift creates static head that reduces pressure and can cause flash gas. Lifting liquid against gravity drops its pressure, and if it falls below saturation the liquid boils into vapour. Flash gas at the metering device reduces capacity, so adequate subcooling must offset the lift.

38. A — Friction loss represents the pressure drop as air moves through the duct and fittings. Surface drag and turbulence consume fan energy along the run. Accounting for it ensures the fan delivers the design airflow.

39. D — Excessive elbows are avoided because each fitting adds pressure drop equivalent to added pipe length. The equivalent-length penalty accumulates and reduces system performance. Minimizing fittings keeps pressure drop within design limits.

40. B — Condensing unit placement must allow clearance for airflow and service access. Restricted airflow raises head pressure, and tight access hampers maintenance. Proper siting protects performance and serviceability.

41. C — Control wire gauge is selected for length and current because undersized wire causes voltage drop and unreliable operation. Excess resistance over a long run can drop the control voltage below the level needed to pull in relays. Correct gauge ensures dependable signalling.

42. A — Evaporator selection hinges on the TD matched to the product and humidity needs. The coil-to-space temperature difference sets dehumidification and product condition. A correct TD maintains both temperature and humidity targets.

43. D — A TXV controls refrigerant flow into the evaporator to maintain superheat. It modulates the orifice in response to the sensing bulb to keep the coil fully active without flooding. Stable superheat protects the compressor and maximizes capacity.

44. B — Verifying the electrical supply confirms voltage and phase match the equipment requirements. Wrong voltage or phasing can damage motors and prevent operation. Confirming supply before install avoids costly equipment failures.

45. A — Suction line insulation prevents heat gain and surface condensation. Without it, the cold line sweats and absorbs heat that lowers efficiency. Insulation protects capacity and prevents water damage from dripping.

46. C — A rooftop curb supports the unit, provides a weather seal, and routes the ducts. It elevates and anchors the equipment while keeping the roof watertight at the penetration. The curb is integral to a sound rooftop installation.

47. D — Air vents at high points release trapped air that would impede water circulation. Air pockets block flow and reduce heat transfer in a hydronic loop. Venting ensures full circulation and proper coil performance.

48. B — Refrigerant selection is driven by operating temperature range, efficiency, and regulatory status. The refrigerant must suit the application's conditions and comply with environmental rules. These factors govern a sound and legal choice.

49. C — The nameplate MCA specifies the minimum circuit ampacity the conductors must carry. It sets the smallest conductor size that safely supplies the unit. Sizing wire to the MCA prevents overheating and code violations.

50. A — In a seismic zone, equipment and piping require restraint and bracing for movement. Seismic forces can shift unsecured equipment and rupture lines. Bracing keeps the system intact and safe during an event.

51. A — Oxygen-free dry nitrogen brought to the specified test pressure is the correct strength and leak-test gas. It is inert, dry, and will not react or introduce moisture. Oxygen and shop air are dangerous or contaminating and must never be used.

52. C — Evacuation removes air and moisture down to a deep vacuum level. Boiling off moisture under vacuum prevents acid formation and ice at the metering device. A proper evacuation is essential before charging.

53. D — A deep vacuum that holds steady after isolating the pump shows the system is dry and tight. A stable micron reading confirms no inward leak and no off-gassing moisture. A rising reading would indicate a leak or remaining moisture.

54. B — The TXV sensing bulb is clamped to a clean horizontal suction line near the evaporator outlet. Good thermal contact at this location lets the bulb sense true outlet temperature for accurate superheat control. Poor placement causes hunting or improper feeding.

55. A — Brazing while flowing nitrogen prevents copper oxide scale from forming inside the tube. The flakes would otherwise circulate and clog the TXV or filter-drier. Nitrogen purging keeps the internal surfaces clean.

56. D — A zeotropic blend must be removed from the cylinder as liquid because charging vapour causes fractionation. The components boil off at different rates, so drawing vapour shifts the blend composition. Charging liquid preserves the intended refrigerant mixture.

57. C — Inadequate support of a long suction line causes sagging that traps oil and stresses brazed joints. Oil pooling in low spots starves the compressor and the strain can crack joints. Proper hanger spacing prevents both problems.

58. B — Rotation must be verified because a scroll or screw compressor can be damaged running in reverse. Reverse rotation produces no pumping and can quickly destroy these compressors. Confirming phase sequence at startup protects the equipment.

59. A — A liquid line filter-drier removes moisture and filters particulate from the refrigerant. It protects the metering device and compressor from contamination and acid. The drier is essential for long-term system reliability.

60. C — Flexible connectors at the air handler reduce transmission of fan vibration into the ductwork. Isolating the duct from the unit prevents noise and structural fatigue. This improves comfort and protects connections.

61. D — A condensate pump must have a safety switch that interrupts cooling if the pump fails. This prevents overflow and water damage when the pump cannot clear the condensate. The interlock is a required protection on high-wall installations.

62. B — Service access ports allow connection of gauges for charging and diagnostics. They give safe access to system pressures without opening the sealed circuit. Ports are essential for commissioning and future service.

63. A — A fire-rated wall penetration requires an approved firestop system maintaining the wall's rating. The firestop reseals the opening so fire and smoke cannot spread through it. Code requires restoring the assembly's integrity at every penetration.

64. D — A low-ambient control maintains adequate head pressure in cold outdoor conditions. Low condensing pressure in winter starves the TXV and reduces capacity. The control keeps head pressure high enough for proper liquid feed.

65. C — A P-trap at the base of a suction riser aids oil return up the vertical riser to the compressor. The trap collects oil so refrigerant velocity can lift it up the riser. This prevents oil logging and compressor lubrication loss.

66. A — Correct flare torque matters because under- or over-torquing can cause leaks or crack the flare. Too little fails to seal; too much splits the copper. Manufacturer torque values produce a reliable, leak-free joint.

67. B — The condensate drain must slope so condensate flows away and does not pool in the pan. Standing water breeds microbial growth and can overflow. Correct slope ensures continuous drainage.

68. C — A control transformer steps the supply voltage down to 24 V for the control circuit. Low-voltage controls rely on this transformer to power thermostats and relays. It is the source of the 24 V control power.

69. D — The charge is weighed in to match the manufacturer's specified charge accurately. Weighing eliminates guesswork and ensures correct system performance, especially on critically charged systems. Accurate charge protects capacity and the compressor.

70. A — Spring or pad isolators are placed between the equipment and the structure for vibration isolation. They absorb operating vibration so it does not transmit into the building. This reduces noise and structural fatigue.

71. C — A suction-line accumulator protects against liquid refrigerant slugging back to the compressor. It holds liquid and meters it back as vapour, allowing only gas to the compressor. This prevents the damage that liquid slugs cause.

72. B — Dissimilar metals at a joint matter because galvanic corrosion can occur where they contact. An electrolytic reaction between unlike metals attacks the joint over time. Proper materials or isolation prevent premature failure.

73. D — A reversing valve directs refrigerant flow to switch between heating and cooling. Its position in the circuit determines which coil acts as condenser or evaporator. Correct installation enables proper heat pump operation.

74. A — Bubbling in the sight glass during steady operation indicates a low charge or restriction causing flash gas. Vapour in the liquid line shows the refrigerant is not fully subcooled liquid. It signals a charge or flow problem to investigate.

75. B — A temperature sensor must make good thermal contact or it gives an inaccurate reading and faulty control. Air gaps let the sensor read ambient instead of pipe temperature. Solid contact ensures the control responds to true conditions.

76. D — A standing pressure test with nitrogen and a leak-detection method confirms joints are leak-free before charging. Holding test pressure and checking for loss verifies integrity without wasting refrigerant. This is the correct pre-charge verification.

77. B — Superheat is the temperature of the vapour above its saturation temperature at that pressure. It confirms the refrigerant has fully boiled to gas before reaching the compressor. Measuring superheat verifies proper evaporator feed and compressor protection.

78. A — Subcooling equals the saturated condensing temperature minus the measured liquid line temperature. It indicates how far the liquid has cooled below its condensing point. Adequate subcooling ensures solid liquid reaches the metering device.

79. C — Very low superheat with a frosting suction line indicates the TXV is overfeeding and liquid is flooding the evaporator. Excess liquid leaves the coil without fully evaporating, chilling the suction line. Flooding risks liquid return and compressor damage.

80. D — High superheat is consistent with an undercharged system or an underfeeding metering device. Too little refrigerant in the coil lets the vapour overheat before the outlet. The reading points to a charge or feed deficiency.

81. A — Low evaporator airflow drops the coil temperature, raising the risk of icing. With less heat reaching the coil, its surface falls below freezing and frost forms. Restoring airflow prevents the ice that further blocks the coil.

82. C — Airflow is found from the heater output, the temperature rise, and a sensible heat constant (the sensible heat equation, $Q = \text{airflow} \times \text{constant} \times \Delta T$). With a known heater output and measured temperature rise, the equation is rearranged to solve for airflow. This is a standard field method for confirming air volume when a flow hood is unavailable.

83. B — Increasing the TXV spring pressure increases the superheat setting of the valve. More spring force requires more superheat before the valve opens. Adjusting the stem tunes the coil's operating superheat.

84. D — Baseline commissioning data provides a reference for diagnosing future performance changes. Comparing later readings to the recorded baseline reveals developing faults. Documentation turns commissioning into a diagnostic tool.

85. A — A high-pressure safety control opens the circuit to stop the compressor and prevent overpressure. Cutting power when pressure reaches the setpoint protects the system from rupture. It is a critical safety device.

86. C — Air balancing delivers the design airflow to each zone or space. Adjusting registers and dampers distributes air for proper comfort and capacity. Balanced airflow ensures the system performs as engineered.

87. D — A blend requires its own pressure-temperature chart because each refrigerant has a unique P-T relationship. Using the wrong chart misreads saturation and leads to charging errors. Blends also have glide, making the correct chart essential.

88. B — A typical electric defrost cycle is started by a timer or demand control and ended by temperature or time. Initiation clears coil frost on schedule or on demand, and termination ends it once the coil clears. Proper defrost control maintains capacity in low-temp systems.

89. A — Compressor current well above nameplate RLA suggests an overloaded compressor, often from high head pressure. Excess load draws more current and risks overheating and tripping. The reading flags a high-side or mechanical problem to investigate.

90. C — Restricted condenser airflow elevates head pressure and raises compressor load. Poor heat rejection forces a higher condensing temperature and pressure. This stresses the compressor and reduces efficiency.

91. B — Trapped air in a chilled-water coil reduces heat transfer and impedes water flow. Air pockets insulate the surface and block circulation. Bleeding the air restores full coil capacity.

92. D — An anti-short-cycle timer protects against rapid compressor restarts that can overload the motor. It enforces an off-period so pressures equalize and the motor cools before restart. This prevents starting-current damage and tripping.

93. A — A clear sight glass with subcooling in range indicates the charge appears adequate with solid liquid feeding the metering device. Subcooled liquid and no bubbles show the high side is supplying full liquid. It is a good sign of proper charge.

94. C — The sequence of operation is tested step by step to verify each component energizes correctly in the right order. Confirming the logic ensures safeties and stages function as designed. Step-testing catches wiring or control faults at commissioning.

95. B — Correct reversing valve operation is confirmed when the flow switches direction and the modes change as commanded. Both heating and cooling must respond to the valve's energizing. Proper switching verifies the heat pump's core function.

96. A — Measuring wet-bulb and dry-bulb temperatures determines the relative humidity and moisture content of the air. The two readings together fix the air's psychrometric state. This is fundamental to evaluating air conditioning performance.

97. D — An economizer uses cool outdoor air for free cooling when conditions allow. Modulating dampers bring in outside air to reduce mechanical cooling. Verifying damper operation confirms the energy-saving function works.

98. B — High superheat with low subcooling and lost capacity points to an undercharged system. Too little refrigerant starves the evaporator and leaves little subcooling at the condenser. Recovering the charge level restores capacity.

99. C — A compressor tripping repeatedly on overload should first be checked for high head pressure from a dirty condenser or low airflow. Elevated head pressure drives up current and trips the overload. Restoring heat rejection often clears the fault.

100. A — Venting refrigerant is prohibited; it must be recovered into approved cylinders. Environmental regulations require recovery to prevent atmospheric release. Compliance protects the environment and avoids penalties.

101. C — A properly operating residential evaporator produces a return-to-supply temperature drop of about 8 to 12°C (roughly 15 to 22°F) at normal indoor humidity. This drop reflects adequate airflow matched to proper refrigerant feed; a smaller drop suggests excess airflow or low charge, while a larger drop points to low airflow or a dirty filter. Verifying the split is a quick field check of overall cooling performance.

102. A — An iced-up evaporator is most likely from low airflow due to a dirty filter or failed blower. Reduced airflow drops the coil below freezing and frost accumulates. Restoring airflow is the first corrective step.

103. D — The system is recovered first because recovery prevents refrigerant loss when the line is opened to replace the drier. Opening a charged line would vent refrigerant illegally and lose the charge. Recovery makes the repair clean and compliant.

104. B — After a burnout, a suction-line filter-drier is critical to capture acids and contaminants. It cleans the circulating refrigerant and oil to protect the replacement compressor. This cleanup step prevents a repeat failure.

105. A — A winding resistance near zero ohms to ground indicates a grounded winding with failed insulation. The short to the motor frame means the insulation has broken down. Such a motor is faulty and unsafe to operate.

106. C — With 24 V present at the coil but the contactor not pulling in, the contactor coil is open or the contactor has failed. Voltage is reaching the coil, so the fault lies in the coil or mechanism. Replacing the contactor restores operation.

107. D — A capacitor failed open will most likely cause the motor to hum and fail to start, then trip on overload. Without the capacitor's phase shift, the motor cannot develop starting torque. The locked rotor draws high current until the overload opens.

108. B — After ruling out charge on a starving evaporator, check the TXV, sensing bulb, and any liquid line restriction. A faulty valve, lost bulb charge, or plugged drier all underfeed the coil. These are the logical next suspects.

109. A — A positive acid test indicates system contamination, often associated with overheating or a burnout. Acid forms when oil and refrigerant break down under high heat. Detecting it directs the technician to clean up the system.

110. D — A heat pump heating poorly with constant auxiliary heat points to a defrost or reversing valve problem, or low charge. Any of these reduces heat-pump output and forces the backup heat to run. These are the primary faults to check.

111. C — Appropriate leak testing uses an electronic detector, bubble solution, or UV dye. These methods reliably locate refrigerant escaping from joints and components. Adding refrigerant or guessing wastes refrigerant and finds nothing.

112. A — A frosted freezer evaporator not reaching temperature calls for checking the defrost system and its termination control first. Failed defrost lets frost block the coil and kill capacity. The defrost circuit is the logical starting point.

113. B — Frequent low-pressure cycling on a fixed-orifice system suggests low charge or restricted flow lowering suction pressure. Too little refrigerant reaching the coil drops suction below the control setpoint. Checking charge and restrictions addresses the cause.

114. C — Voltage imbalance between phases causes excessive current and motor overheating. A small voltage imbalance produces a much larger current imbalance in the windings. This overheats the motor and shortens its life.

115. A — Non-condensable gases collect in the condenser and high side, raising head pressure abnormally. Because they cannot condense, they occupy condenser volume and add their partial pressure to the refrigerant pressure, so head pressure runs high for the given conditions. Recovery followed by proper evacuation removes them and restores normal operation.

116. C — A humming compressor that trips after the capacitor is checked calls for testing the start components, windings, and for a possible seized rotor. A mechanical seizure or winding fault also prevents starting. These checks isolate the cause.

117. B — A head pressure control maintains sufficient head pressure for proper TXV operation in cold weather. Adequate high-side pressure ensures the valve feeds enough liquid. Without it, capacity falls in low ambient conditions.

118. A — Low refrigerant charge or a high compression ratio raises the discharge temperature. Less refrigerant means less cooling of the compressor and hotter discharge gas. Excessive discharge temperature can break down oil and damage the compressor.

119. A — Oil staining at a fitting most likely indicates a refrigerant leak carrying oil with it. Escaping refrigerant brings entrained oil that collects at the leak point. The stain is a visual marker for locating the leak.

120. C — A dirty condenser reduces heat rejection and raises head pressure. The insulating layer of dirt impairs heat transfer, forcing higher condensing pressure. Cleaning restores capacity and efficiency.

121. B — A defrost termination thermostat that never opens lets the defrost run too long, wasting energy and adding heat to the space. The cycle should end when the coil clears, but a stuck-closed control keeps heating. This wastes energy and can raise box temperature.

122. D — An internally leaking reversing valve shows reduced capacity with the suction line warmer than expected. Hot discharge gas bypasses internally and warms the suction side. The capacity loss and warm suction line are the diagnostic signs.

123. A — A thermistor is checked by measuring its resistance and comparing to a temperature chart. Its resistance varies predictably with temperature, so the reading verifies calibration. A reading off the chart indicates a faulty sensor.

124. C — Replacement refrigerant for a retrofit must be selected for compatibility with the oil, materials, and system design. The wrong refrigerant can attack seals or fail to circulate oil. Compatibility ensures a safe, reliable retrofit.

125. A — A complete service record establishes a history for warranty, compliance, and future diagnostics. Documented readings and actions support warranty claims, satisfy regulations, and speed later troubleshooting. Good records are a core professional practice.