PRACTICE EXAM 26: RACM RED SEAL SIMULATION (125 QUESTIONS)

1. A technician is assigned to braze refrigerant piping inside a small electrical room with the door closed. Before any open-flame work begins, which action most directly controls the primary hazard of that environment?

A. Confirm the floor is swept clean of any loose metal debris

B. Set the brazing torch to its lowest possible flame setting

C. Provide ventilation and remove or shield combustible materials

D. Wear tinted goggles rated for general grinding operations only

2. A Safety Data Sheet for a refrigerant lists exposure limits and engineering controls. In which SDS section would a technician find this exposure-control information?

A. Section 8, which covers exposure controls and personal protection

B. Section 2, which lists only the hazard classification of the product

C. Section 13, which addresses disposal of the unused product

D. Section 16, which contains general non-mandatory information

3. Two workers must move a 60 kg condenser across a job site on a wheeled cart over an uneven floor. Which practice best reduces the risk of injury during the move?

A. Push the cart quickly so it carries momentum over the rough spots

B. Pull the cart backward while watching the load instead of the path

C. Stack additional tools on top of the condenser to save a second trip

D. Push rather than pull, keep the load low, and clear the path first

4. A technician notices a coworker bypassing a machine guard on a shop bandsaw to speed up a cut. What is the most appropriate response?

A. Ignore it because the coworker is more experienced on that machine

B. Stop the unsafe practice and report the hazard per site procedure

C. Wait until the cut is finished, then mention it casually afterward

D. Bypass the guard on the next machine to keep the pace consistent

5. A lockout/tagout procedure is required before servicing a packaged rooftop unit. What is the fundamental purpose of lockout/tagout?

A. To isolate and secure energy sources so equipment cannot start

B. To record the technician's arrival time at the job site that day

C. To increase the unit's cooling capacity before the service work

D. To identify the paint colour used on the disconnect enclosure

6. A technician must select gloves for handling sheet metal ductwork with sharp edges. Which glove property is most relevant to the hazard?

A. Chemical permeation resistance against strong refrigerant acids

B. High thermal insulation rating for handling hot brazed joints

C. Cut resistance suited to handling sharp sheet-metal edges

D. Electrical insulation rated for live high-voltage conductors

7. During a job briefing, a journeyperson assigns tasks and confirms each worker understands their role. Why is this communication step important on a crew?

A. It eliminates the need for any written work orders on the site

B. It allows the journeyperson to leave the site immediately after

C. It guarantees the job will finish ahead of the planned schedule

D. It clarifies responsibilities and reduces errors and conflicts

8. A technician is using a step stool, an extension cord, and a corded drill in a damp basement. Which precaution most directly addresses the electrical hazard of the location?

A. Coil the extension cord neatly to keep it off the wet floor surface

B. Supply the circuit through a ground-fault circuit interrupter

C. Use a longer extension cord so the panel is farther from the water

D. Run the drill at a reduced speed to lower the current it draws

9. A technician must organize the day's work involving three separate service calls. Which approach reflects sound work organization?

A. Plan the route and sequence calls by priority and location

B. Drive to whichever call is closest without checking priority

C. Complete all paperwork for every call before leaving the shop

D. Start the most difficult call last regardless of the appointment

10. A pictogram on a chemical container shows a flame over a circle. Under WHMIS 2015, what hazard class does this oxidizer pictogram communicate?

A. The product is corrosive to metals and to skin on contact

B. The product is an acute aquatic-environment toxicant only

C. The product is a compressed gas under pressure in the cylinder

D. The product is an oxidizer that can intensify a fire

11. A technician working alone in a remote mechanical room must follow a working-alone procedure. What is the main purpose of such a procedure?

A. To assign two technicians to every task regardless of its size

B. To require the technician to finish faster than a two-person crew

C. To ensure a check-in system so help arrives if an incident occurs

D. To reduce the amount of personal protective equipment required

12. A technician must clean refrigerant oil from a concrete shop floor after a spill. According to good practice and the SDS, what is the correct first step?

A. Rinse the oil down the nearest floor drain with plenty of water

B. Contain the spill and use an appropriate absorbent material

C. Spread the oil thinly with a broom so it evaporates faster

D. Leave the area and allow the oil to soak into the concrete

13. A technician must verify a torque value on a compressor mounting bolt. Which tool provides the correct measured tightening?

A. A calibrated torque wrench set to the specified value

B. An impact driver run until the bolt stops turning fully

C. A standard ratchet tightened by feel until it seems snug

D. A pipe wrench applied to the bolt head for extra leverage

14. A technician prepares to braze a copper joint and stages the work area in an occupied building. Which combination of preparations best addresses the fire and damage risks together?

A. Open windows for fresh air and leave combustibles where they sit

B. Move flammables, increase the flame size, and skip the fire watch

C. Lower the torch pressure and rely on the building sprinkler heads

D. Clear combustibles, place a heat shield, and stage an extinguisher

15. A technician must cut and prepare a length of refrigeration-grade copper tube for brazing. Which sequence of steps produces a sound joint?

A. Cut with a hacksaw, leave the burr, and braze immediately after

B. Cut with a tubing cutter, ream the burr, clean, then braze

C. Crush the tube to size, file the end flat, and braze without cleaning

D. Cut with a torch, quench in water, and braze while still warm

16. A technician is selecting filler metal to braze copper-to-copper refrigerant joints. Which filler characteristic makes flux unnecessary on that joint?

A. A phosphorus-bearing copper alloy that is self-fluxing on copper

B. A high-silver alloy that requires aggressive acid flux to flow

C. A lead-based soft solder rated only for low-pressure water lines

D. An aluminum-based rod intended for joining aluminum coils only

17. A routine task requires forming a 90-degree bend in soft copper tubing for a tight equipment connection. What is the correct method to avoid flattening the tube?

A. Heat the tube red-hot and bend it freehand over the knee

B. Clamp the tube in a vise and bend it sharply by hand

C. Use a tube bender that supports the wall through the radius

D. Fill the tube with water and bend it slowly without a tool

18. A technician must connect two different-diameter copper tubes in a liquid line. Which fitting or method correctly joins tubes of unequal size?

A. A reducing coupling sized to match both tube diameters

B. A flare nut forced onto the larger tube without a fitting

C. A swage of the smaller tube to fit over the larger tube

D. A compression union with both ferrules left off the joint

19. A technician is pressure-testing a newly assembled liquid line during routine work. Which test medium and method are correct for verifying the joints?

A. Shop air pressurized to test value with the lines left open

B. Dry nitrogen brought to the specified pressure with a leak check

C. System refrigerant released to find leaks by the escaping odour

D. Water filled into the line and pressurized with a hand pump

20. A technician must label a recovered-refrigerant cylinder before transport. Which labelling information is required?

A. Refrigerant type, recovered status, and the appropriate hazard label

B. Only the technician's initials written in marker on the valve cap

C. The estimated resale value of the recovered refrigerant inside

D. Nothing, because recovered refrigerant is exempt from labelling

21. A technician is supporting a horizontal copper suction line during a routine install. Why must hanger spacing follow the manufacturer's or code recommendations?

A. Wider spacing always improves the refrigerant's flow velocity

B. Spacing has no effect once the line is charged with refrigerant

C. Inadequate support causes sag that traps oil and stresses joints

D. Closer spacing increases the system's required refrigerant charge

22. A technician must protect a refrigerant line where it passes through a sheet-metal partition. What is the correct routine practice at that point?

A. Braze the line solidly to the partition for permanent support

B. Fill the entire opening with expanding foam around the line

C. Leave the tube resting on the cut edge to allow free movement

D. Install a grommet or sleeve to prevent abrasion at the edge

23. A technician completes a routine pipe run and must purge it before connecting the system. Why is purging with dry nitrogen performed before final assembly?

A. To pressurize the line so the joints expand for easier fitting

B. To displace moisture and debris from the interior of the line

C. To add lubricating oil mist to the inside of the tubing wall

D. To raise the line temperature so the refrigerant charges faster

24. A technician records the refrigerant added during a routine top-up. Why is this documentation a required part of the trade activity?

A. For regulatory leak-tracking and accurate system service history

B. Only to calculate the fuel used driving between job sites

C. To determine which colour to repaint the recovery cylinder

D. Because the refrigerant degrades the moment it is written down

25. A technician is selecting insulation for a chilled-water line in an unconditioned space. Which insulation property is most important for that application?

A. A bright reflective outer colour to improve the line's appearance

B. A low compressive strength so the insulation crushes onto the pipe

C. An adequate vapour barrier and R-value to prevent condensation

D. A high permeability that lets moisture pass freely through it

26. A technician must deburr the inside of several freshly cut copper tubes during a routine job. What problem does skipping this step create?

A. The outside diameter becomes too large for the fittings to seat

B. The internal burr restricts flow and creates turbulence in the line

C. The copper becomes too soft and collapses under its own weight

D. The tube end work-hardens and cannot be flared or swaged later

27. A technician encounters a refrigerant cylinder with an unreadable, peeling label during a routine task. What is the correct action?

A. Assume the contents from the cylinder's paint colour and proceed

B. Connect it to the system and read the pressure to identify the gas

C. Vent a small sample and identify the refrigerant by its odour

D. Do not use it; positively identify the contents before any use

28. A technician installs vibration-isolating pipe supports on a routine job. What is the main function of these supports?

A. To dampen vibration transmitted from the equipment into the structure

B. To increase the refrigerant pressure inside the supported line

C. To act as the system's primary electrical grounding path

D. To meter the flow of refrigerant through the supported section

29. A technician must select a flux for soft-soldering copper water lines on a hydronic system. Which flux behaviour is correct for the task?

A. A flux that bonds the joint without any solder being applied

B. A flux that raises the solder's melting point for a stronger bond

C. A flux that cleans oxides and helps the solder wet the copper

D. A flux that leaves a heavy insulating coating inside the pipe

30. A technician is staging materials and confirming quantities for a routine install. Against which document should the delivered materials be checked?

A. The previous customer's signed final inspection certificate

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

C. A blank time sheet that has not yet been filled in for the day

D. The manufacturer's marketing brochure for the equipment

31. A technician finds the only available work light is flickering and dim during a routine task in a dark plenum. What is the appropriate response?

A. Work by touch and feel since the layout is already familiar

B. Use a phone camera flash held by a coworker the whole time

C. Postpone all work indefinitely until permanent lights are added

D. Provide proper temporary task lighting before continuing the work

32. A technician completes a routine service and prepares to leave an occupied site. Which closing practice reflects professional conduct?

A. Reinstall panels, clean the area, and inform the customer of the work

B. Leave the access panels off so the next technician can see inside

C. Depart quietly without disturbing the customer to save their time

D. Leave offcuts and packaging for the building staff to dispose of

33. A technician plans the suction line size for a long horizontal run with a vertical riser. Which design goal must the sizing balance against acceptable pressure drop?

A. Maximizing the pipe diameter to eliminate all pressure drop

B. Minimizing the pipe diameter to reduce the material cost only

C. Maintaining velocity high enough to return oil up the riser

D. Matching the suction line diameter to the liquid line diameter

34. A technician is planning a heat-load estimate for a server room with year-round cooling. Which internal gain is the dominant load in that space?

A. Solar gain through the building's exterior glazing at midday

B. Infiltration of outdoor air through the exterior door seals

C. Occupant body heat from a large number of seated people

D. Sensible heat rejected by the electronic equipment in the room

35. A technician plans the control wiring for a multi-stage cooling system. What does a properly drawn control schematic primarily allow the installer to do?

A. Calculate the exact refrigerant charge the system will require

B. Wire and verify the control circuit and its sequence correctly

C. Select the paint colour for the equipment access panels

D. Determine the structural load the curb must support on the roof

36. A technician plans the liquid line for a system where the condenser sits well below the evaporator. What design concern does this vertical lift create?

A. Static head from the lift can cause flash gas if subcooling is low

B. The lift increases liquid subcooling automatically as it rises

C. The vertical lift has no effect on liquid line performance at all

D. The lift requires the suction line to be insulated at the top only

37. A technician plans duct sizing using the equal-friction method. What does this method hold constant along the duct system?

A. The air velocity in every duct section regardless of its size

B. The total airflow delivered to each individual supply register

C. The friction loss per unit length throughout the duct runs

D. The static pressure measured at the very end of each branch

38. A technician selects an evaporator coil for a medium-temperature cooler with humidity-sensitive product. Which selection factor most affects the stored product's condition?

A. The shipping weight of the coil as delivered to the site

B. The brand name printed on the coil's identification nameplate

C. The number of mounting brackets supplied with the coil

D. The coil TD, since it governs the humidity held in the space

39. A technician plans the refrigerant type for a new low-temperature freezer system. Which combination of factors should drive the selection?

A. Operating temperature range, efficiency, oil compatibility, and regulations

B. The colour the customer would prefer the cylinders to be painted

C. The brand of recovery machine currently available in the shop

D. The total length of the longest copper line run on the project

40. A technician plans the electrical circuit for a packaged unit and reads the nameplate. What does the maximum overcurrent protection (MOP) value specify?

A. The minimum conductor ampacity required to supply the unit

B. The refrigerant charge that must be weighed into the system

C. The largest fuse or breaker permitted to protect the circuit

D. The maximum static pressure the supply fan can develop

41. A technician plans the placement of an outdoor condensing unit at a residence. Which siting factor most directly affects the unit's performance?

A. Positioning it where it is most visually hidden from the street

B. Allowing clearance so discharge air is not recirculated into the coil

C. Mounting it as close as possible to the home's bedroom window

D. Setting it directly on soft soil to absorb operating vibration

42. A technician plans a condensate disposal route for a high-efficiency furnace and coil. Why must the condensate be handled as required by code?

A. The condensate carries refrigerant that must be recovered

B. The condensate sets the static pressure across the coil

C. The condensate determines the refrigerant charge weight

D. The condensate is acidic and corrosive and must drain safely

43. A technician plans a TXV-fed evaporator and must specify the valve's external equalizer connection. Why is an external equalizer used on many TXV installations?

A. It compensates for evaporator pressure drop to control superheat accurately

B. It increases the high-side discharge pressure during operation

C. It eliminates the need for a sensing bulb on the suction line

D. It converts the TXV into a fixed-orifice metering device

44. A technician plans the installation of refrigerant piping that must penetrate a fire-rated floor assembly. What must the plan include at that penetration?

A. An oversized open sleeve left unsealed for future line changes

B. The line insulation stripped away where it passes through

C. An approved firestop system that maintains the floor's fire rating

D. Ordinary tape wrapped around the line at the floor level only

45. A technician plans the location of service access ports on a new installation. Why is accessible port placement part of good installation planning?

A. Ports serve as the structural anchor for the condensing unit

B. Ports replace the need for a liquid line filter-drier in the system

C. Ports function as the metering device feeding the evaporator

D. Accessible ports allow safe gauge connection for service later

46. A technician plans pipe insulation thickness for a suction line in a humid plenum. Which consequence results from specifying insulation that is too thin?

A. The refrigerant velocity in the suction line increases sharply

B. Heat gain and surface condensation occur on the cold line

C. The suction pressure rises above the system's design point

D. The compressor's required oil charge increases over time

47. A technician plans a chilled-water distribution loop and must locate the air-elimination devices. Where should automatic air vents be placed in the loop?

A. At the system's high points where air naturally collects

B. At the lowest point of the loop near the circulating pump

C. On the refrigerant suction line of the chiller compressor

D. Inside the conditioned space at every supply diffuser

48. A technician plans the wire size for a long control-circuit run between a thermostat and an air handler. Why must voltage drop be considered in the plan?

A. Larger wire reduces the system's required refrigerant charge

B. Voltage drop has no effect on a 24-volt control circuit

C. Excess voltage drop can prevent relays and contactors from pulling in

D. Smaller wire raises the control transformer's secondary voltage

49. A technician plans equipment anchoring for an installation in a high-wind coastal region. What does the plan need to address for the rooftop equipment?

A. Repainting the equipment in a salt-resistant colour scheme

B. Lowering the refrigerant charge to reduce the unit's weight

C. Operating the system at a higher condensing pressure setpoint

D. Wind-load restraint and tie-downs rated for the design wind speed

50. A technician plans a system using a zeotropic blend and must account for temperature glide. How should the plan treat glide when selecting controls and charging?

A. Treat the blend as a single-temperature refrigerant with no glide

B. Account for glide using the correct dew/bubble points for the blend

C. Ignore glide because it disappears once the system is running

D. Charge the blend as vapour to remove the glide from the mixture

51. A technician is installing a new condensing unit and must pressure-test the field piping before evacuation. The system is charged with nitrogen to 3,100 kPa and holds steady overnight with no pressure loss. What does this result confirm?

A. The system is fully evacuated and ready for the refrigerant charge

B. The refrigerant charge weight matches the manufacturer's data plate

C. The compressor windings are correctly insulated to ground

D. The field-brazed joints are leak-tight at the test pressure used

52. A technician evacuates a newly installed split system and pulls it to 400 microns. After isolating the vacuum pump, the reading rises and stabilizes at 1,500 microns. What does this rise-and-hold behaviour most likely indicate?

A. Moisture remaining in the system that is off-gassing under vacuum

B. A large refrigerant leak releasing gas rapidly into the system

C. The vacuum pump is oversized for the volume being evacuated

D. The system is dry and tight and ready to be charged at once

53. A technician installs a TXV and must position the sensing bulb on the suction line. For accurate superheat control, where and how is the bulb mounted?

A. On the vertical liquid line just below the condenser outlet

B. Loosely taped to the discharge line near the compressor head

C. On a clean horizontal suction line with firm thermal contact

D. Inside the evaporator coil among the lower return bends

54. A technician brazes the field joints on a new refrigerant circuit. Why is dry nitrogen flowed through the tubing while the joints are heated?

A. To pressurize the line so each joint forms more quickly

B. To prevent internal oxide scale from forming inside the tubing

C. To cool the joint rapidly and keep the copper from annealing

D. To introduce moisture that helps the filler metal flow in

55. A technician installs a liquid line filter-drier with a directional arrow on its body. Why must the drier be installed in the correct orientation?

A. The arrow indicates which end to braze first during installation

B. Orientation determines the colour the drier should be painted

C. Reversed flow has no effect on the drier's filtering ability

D. The arrow shows refrigerant flow direction for proper filtering

56. A technician must charge a system with a zeotropic blend from a cylinder. To preserve the blend composition, how should the refrigerant be drawn out?

A. As vapour from the top of the cylinder to keep the blend stable

B. After heating the cylinder in hot water to above 60 degrees

C. As liquid from the cylinder, since vapour draw causes fractionation

D. By venting some refrigerant first to clear the cylinder valve

57. A technician wires a three-phase scroll compressor during installation and must confirm correct rotation. Why is verifying rotation critical for this compressor type?

A. Reverse rotation produces no pumping and can damage the scroll set

B. Reverse rotation simply runs the compressor at a slower speed

C. Rotation direction has no effect on any scroll compressor

D. Reverse rotation increases the refrigerant charge that is needed

58. A technician installs a suction-line accumulator on a heat pump. What does this component protect the compressor against?

A. Excessive subcooling building up at the condenser outlet

B. High head pressure occurring during the cooling season

C. Low static pressure developing in the supply air ductwork

D. Liquid refrigerant slugging back into the compressor

59. A technician installs ductwork and connects it to the air handler with a flexible canvas connector. What is the primary purpose of this connector?

A. To act as the main structural support for the duct weight

B. To isolate fan vibration from being transmitted into the duct

C. To increase the static pressure the supply fan can develop

D. To filter particulate matter out of the supply air stream

60. A technician installs a condensate drain with a P-trap on a draw-through air handler. Why is the trap required on this configuration?

A. The trap meters refrigerant flow into the evaporator coil

B. The trap raises the condensate temperature before it drains

C. The trap maintains a seal against the negative pan pressure

D. The trap increases the static pressure across the cooling coil

61. A technician installs flare connections on small-diameter copper during a ductless split installation. What ensures each flare seals correctly under pressure?

A. A correctly formed flare torqued to the manufacturer's value

B. A flare cracked slightly so refrigerant can seat the joint

C. A flare made on work-hardened copper without annealing

D. A flare tightened far past the specified torque for safety

62. A technician installs a low-ambient head pressure control on an air-cooled condenser. What does this control accomplish in cold weather?

A. It raises the evaporator superheat to protect the compressor

B. It increases the compressor oil charge during winter months

C. It shuts the system off entirely below the freezing point

D. It maintains adequate head pressure for proper TXV feed

63. A technician installs refrigerant lines and must support a long vertical riser. Which installation detail aids oil return on a suction riser?

A. Sloping the entire riser downward toward the compressor

B. Forming a trap at the base and sizing for adequate velocity

C. Increasing the riser diameter to slow the refrigerant down

D. Insulating only the top of the riser to keep the oil warm

64. A technician connects the 24-volt control circuit on a new furnace and coil. Which component supplies the 24-volt power to the control circuit?

A. The control transformer mounted in the furnace cabinet

B. The compressor contactor coil on the condensing unit

C. The defrost termination thermostat on the evaporator

D. The crankcase heater wrapped around the compressor base

65. A technician installs equipment that requires vibration isolation between the unit and a steel structure. Which method correctly provides that isolation?

A. Bolting the unit rigidly and directly to the steel beam

B. Resting the unit loosely on the bare structural steel

C. Placing spring or pad isolators between the unit and steel

D. Hanging the unit from the refrigerant piping for flexibility

66. A technician installs a sight glass with a moisture indicator in the liquid line. During steady operation, a stream of bubbles in the glass most likely indicates what?

A. The refrigerant is correctly charged and fully subcooled

B. The compressor crankcase oil level has become too high

C. The condenser fan is running at an excessive speed setting

D. A low charge or restriction producing flash gas in the line

67. A technician must penetrate a fire-rated wall with refrigerant lines during installation. What is required to maintain the wall's integrity at the opening?

A. The lines packed loosely into an oversized unsealed hole

B. An approved firestop system rated to match the wall assembly

C. The line insulation removed entirely at the wall opening

D. The opening sealed with ordinary duct tape on both sides

68. A technician installs a reversing valve on a heat pump circuit. What does the position and piping of this valve allow the system to do?

A. Reverse refrigerant flow to switch between heating and cooling

B. Meter refrigerant flow into the evaporator like an expansion valve

C. Filter moisture and acids from the circulating refrigerant

D. Store excess liquid refrigerant during the off cycle

69. A technician torques the flare nuts on a mini-split during installation, following the data plate. What is the consequence of significantly over-torquing a flare nut?

A. The connection automatically seals tighter with no downside

B. The system superheat setting is raised by the extra torque

C. The flare can split or deform, creating a refrigerant leak

D. The refrigerant charge weight is reduced by the tightening

70. A technician installs a packaged rooftop unit on a curb and connects the ductwork. Why must the curb provide a proper weather seal?

A. The curb seal sets the refrigerant subcooling at the condenser

B. The curb seal acts as the electrical ground for the entire unit

C. The curb seal increases the unit's refrigerant holding capacity

D. The curb seal prevents water leakage into the building below

71. A technician weighs in the refrigerant charge on a newly installed critically charged system. Why is weighing the charge the preferred method here?

A. Weighing changes the refrigerant into a safer non-flammable type

B. The manufacturer specifies an exact charge that weighing achieves

C. The cylinder colour requires a precisely measured quantity

D. Weighing lowers the pressure drop in the installed suction line

72. A technician installs a condensate pump for a ductless head with no gravity drain. Which safety feature must the installation include?

A. A float switch that interrupts cooling if the pump fails to clear water

B. A connection that discharges the condensate into the suction line

C. Continuous pump operation that runs regardless of the water level

D. Wiring of the pump directly to the high-pressure safety switch

73. A technician installs dissimilar metal components in a refrigerant or water circuit. Why must this junction be given special attention during installation?

A. Dissimilar metals always braze together more easily than like metals

B. The metal combination sets the system's required superheat value

C. Galvanic corrosion can occur at the junction of dissimilar metals

D. Dissimilar metals raise the refrigerant's saturation pressure

74. A technician installs and commissions the wiring for a multi-stage thermostat. Why is each stage's wiring verified during installation?

A. To select the correct paint colour for the thermostat cover

B. To set the refrigerant charge required for each cooling stage

C. To determine the duct static pressure at each supply outlet

D. To confirm each stage energizes the correct equipment in order

75. A technician installs a temperature sensor on a pipe as part of a control system. Why is firm thermal contact between sensor and pipe essential?

A. Firm contact increases the refrigerant charge held in the line

B. Poor contact causes inaccurate readings and faulty control action

C. Firm contact lowers the control circuit's required voltage

D. Poor contact has no measurable effect on the sensor's reading

76. A technician completes the field piping and must confirm leak-tightness before charging the new system. Which method correctly verifies the joints?

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

B. A brief run of the compressor to pressurize and check the joints

C. A visual inspection of the brazed joint colour by itself

D. Adding the refrigerant first and watching for any pressure rise

77. A technician commissions a system and reads 4°C of superheat with a slightly cold, sweating suction line at the compressor. What does this low superheat reading most likely indicate?

A. The evaporator is starved and short of refrigerant feed

B. The condenser airflow is severely restricted by debris

C. The metering device is overfeeding and the coil may be flooding

D. The high-pressure safety control has tripped the compressor

78. A technician commissions a unit and calculates subcooling of 1°C at the condenser outlet on a hot day. What does this very low subcooling suggest?

A. The system is significantly overcharged with refrigerant

B. The condenser is heavily oversized for the cooling load

C. The compressor is running in the reverse rotation direction

D. The system is undercharged or has insufficient liquid feed

79. A technician commissioning an air system measures a 22°C dry-bulb temperature drop across the evaporator at the rated airflow. Compared with a typical split, what does this large drop suggest?

A. The airflow is excessive and is overcooling the supply air

B. The airflow is too low for the coil's capacity at this condition

C. The refrigerant charge is far above the manufacturer's value

D. The condenser is rejecting too much heat for the load present

80. A technician commissions a TXV system and needs to raise the operating superheat slightly. How is the TXV adjusted to accomplish this?

A. Turn the adjustment stem to increase the valve's spring pressure

B. Add refrigerant until the suction pressure rises substantially

C. Replace the TXV with a larger fixed-orifice metering device

D. Lower the condenser fan speed to raise the head pressure

81. A technician commissions an electric duct heater and measures a temperature rise to verify airflow. Which relationship is used to calculate the airflow from the measured data?

A. Airflow equals the duct area divided by the velocity pressure

B. Airflow equals the refrigerant mass flow times the latent heat

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

D. Airflow equals the static pressure times the fan motor amperage

82. A technician commissions a system using a blended refrigerant and must read the pressures accurately. Why is the correct pressure-temperature chart for that specific blend required?

A. All refrigerants share one universal pressure-temperature curve

B. The chart determines the electrical supply voltage to the unit

C. The chart sets the flare-nut torque on the refrigerant lines

D. Each blend has its own unique pressure-temperature relationship

83. A technician commissions a low-temperature evaporator and verifies the defrost cycle. What correctly describes a typical timed electric defrost sequence?

A. A timer or demand control initiates it; temperature or time ends it

B. The discharge pressure rising past a limit both starts and ends it

C. The condenser fan ambient sensor controls the entire defrost cycle

D. The sight glass clearing of bubbles starts and stops the defrost

84. A technician commissions a unit and records compressor amperage well above the nameplate RLA. Which condition is most consistent with this reading?

A. The system is undercharged and starved of refrigerant flow

B. The control transformer is supplying excessive secondary voltage

C. The compressor is overloaded, possibly from high head pressure

D. The evaporator superheat is set too high to draw any current

85. A technician commissions an air system and balances the supply branches. What is the objective of the air-balancing process?

A. To raise the refrigerant subcooling measured at the condenser

B. To deliver the design airflow to each conditioned space or zone

C. To increase the total static pressure within the main trunk duct

D. To correct a voltage phase imbalance at the electrical panel

86. A technician commissions a system and verifies the operation of the high-pressure cutout. What should this control do when its setpoint is reached?

A. Open the expansion valve fully to relieve the high-side pressure

B. Increase the condenser fan speed to bring head pressure down

C. Add refrigerant automatically to balance the system pressures

D. Open the control circuit to stop the compressor and prevent damage

87. A technician commissions an economizer on a rooftop unit and confirms the dampers modulate. What is the economizer designed to provide?

A. Free cooling using suitable outdoor air when conditions allow

B. A higher discharge pressure for the compressor on demand

C. Precise weighing of the refrigerant charge into the system

D. Increased subcooling of the liquid during peak load periods

88. A technician commissions a system and records baseline pressures and temperatures. Why is this documented baseline valuable beyond commissioning day?

A. It sets the refrigerant type that the system was charged with

B. It eliminates the need for any future maintenance on the unit

C. It provides a reference for diagnosing later performance changes

D. It determines the colour code applied to the control wiring

89. A technician commissions a heat pump and tests the reversing valve in both modes. What outcome confirms the valve is operating correctly?

A. The compressor stops each time the reversing valve is energized

B. The suction pressure remains identical in heating and cooling

C. The condenser fan reverses its rotation in the heating mode

D. The refrigerant flow switches and the modes change as commanded

90. A technician commissioning a chilled-water coil bleeds trapped air from the high points. Why is removing this air necessary for proper operation?

A. The trapped air increases the refrigerant charge held in the loop

B. Air pockets reduce heat transfer and impede water circulation

C. The trapped air raises the chilled-water supply temperature target

D. The air improves circulation and should be retained in the coil

91. A technician commissions a system and sets the anti-short-cycle timer on the control. What does this timer protect the equipment against?

A. Rapid compressor restarts that can overload and damage the motor

B. Excessive subcooling forming at the condenser outlet on startup

C. Air becoming trapped at the high points of the piping system

D. Low refrigerant velocity occurring in the horizontal suction line

92. A technician commissions a control system and tests the sequence of operation step by step. Why is this stepwise verification performed?

A. To select the proper paint colour for the control panel cover

B. To calculate the refrigerant charge weight for the whole system

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

D. To set the torque on the refrigerant flare connections precisely

93. A technician commissioning a system finds the liquid line sight glass clear with subcooling in the normal range. What does this combination indicate?

A. The compressor is operating in the reverse rotation direction

B. The system is badly undercharged and starving the evaporator

C. The condenser fan motor has failed completely during the test

D. The charge appears adequate with solid liquid reaching the valve

94. A technician commissions an air handler and measures wet-bulb and dry-bulb supply temperatures. What air property is being determined from these readings?

A. The static pressure that the supply fan is currently developing

B. The relative humidity and moisture content of the supply air

C. The refrigerant superheat present at the evaporator outlet

D. The electrical power factor of the supply fan motor circuit

95. A technician commissions a system and verifies that condenser airflow is unobstructed. What does restricted condenser airflow most directly cause?

A. Elevated head pressure and increased compressor load

B. Reduced refrigerant charge requirement for the system

C. Lower-than-normal suction pressure with suction-line frost

D. Negative subcooling measured at the condenser outlet

96. A technician commissions a packaged unit and confirms the condensate drain slopes correctly. Why is the correct drain slope important at commissioning?

A. It increases the airflow delivered across the evaporator coil

B. It raises the refrigerant charge that the system can hold

C. It ensures condensate flows away and does not pool in the pan

D. It reduces the electrical load drawn by the supply fan motor

97. A technician commissions a multi-stage system and confirms the stages activate in sequence. Why is verifying staged operation part of commissioning?

A. To set the flare-nut torque values on each refrigerant line

B. To confirm capacity stages energize correctly under rising load

C. To determine the paint colour for the equipment access panel

D. To calculate the refrigerant subcooling at the condenser outlet

98. A technician services a system reporting weak cooling and measures high superheat with low subcooling. Which diagnosis best fits this combination of readings?

A. The system is overcharged with refrigerant beyond the data plate

B. The evaporator is flooded with excess liquid refrigerant feed

C. The condenser fan motor is running in the reverse direction

D. The system is undercharged and short on refrigerant

99. A technician finds a compressor repeatedly tripping on its thermal overload. Which condition should be investigated first as a likely cause?

A. High head pressure from a dirty condenser or restricted airflow

B. The presence of normal subcooling at the condenser outlet

C. A clean evaporator coil with full and unobstructed airflow

D. A correctly sized circuit feeding a properly charged system

100. A technician must remove refrigerant from a system before opening it for repair. Under environmental regulations, how must the refrigerant be handled?

A. Vented slowly to atmosphere if the total charge is under a kilogram

B. Released outdoors where it can disperse safely in the open air

C. Recovered into an approved cylinder rather than vented to atmosphere

D. Discharged into the building drain along with plenty of water

101. A technician services an air system with a heavily iced evaporator coil. Which cause should be checked first for this symptom?

A. The condenser airflow being far above the design value

B. Low airflow from a dirty filter or a failing blower motor

C. The refrigerant charge being far above the data-plate weight

D. The thermostat setpoint being set far too high for the space

102. A technician measures the resistance of a motor winding to the motor frame and reads near zero ohms. What does this reading indicate about the winding?

A. The winding is open with no electrical continuity present

B. The winding is healthy with fully intact insulation to ground

C. The motor is operating correctly under its rated full load

D. The winding is grounded due to failed insulation to the frame

103. A technician troubleshoots a no-cool call and measures 24 volts at the contactor coil, but the contactor will not pull in. What is the most likely fault?

A. The contactor coil is open or the contactor mechanism has failed

B. The room thermostat is open and is not calling for cooling

C. The supply breaker feeding the condensing unit is switched off

D. The refrigerant charge is slightly below the target weight value

104. A technician tests a run capacitor on a single-phase condenser fan motor that hums but will not start. A capacitor that has failed open will most likely cause what symptom?

A. The motor runs noticeably faster than its rated nameplate speed

B. The motor overcharges the refrigerant circuit during operation

C. The motor fails to start, hums, and trips on its thermal overload

D. The condenser excessively subcools the liquid leaving the coil

105. A technician services a system after a compressor burnout and must clean up the circuit. Which component is essential to install during the cleanup?

A. A larger condenser fan motor to increase the airflow rate

B. A second expansion valve piped in parallel with the first

C. An additional sight glass installed in the discharge line

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

106. A technician performs an acid test on the oil sample drawn from a system. A positive acid test result most directly indicates what condition?

A. The refrigerant charge is correctly within the specified range

B. System contamination, often linked to overheating or a burnout

C. The oil is fresh and fully suitable for continued service use

D. The condenser airflow is operating exactly at its design rate

107. A technician services a heat pump that heats poorly in cold weather while the auxiliary heat runs almost constantly. Which fault group should be checked?

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

B. The economizer dampers stuck closed during the summer season

C. The chilled-water pump cavitating at the system's high points

D. A dry condensate trap on the cooling coil's drain connection

108. A technician must locate a slow refrigerant leak on a system that loses charge over weeks. Which leak-detection approach is appropriate?

A. Adding refrigerant repeatedly until the leak stops by itself

B. Listening only for an audible hiss near the system components

C. Spraying plain water on the joints and watching for steam

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

109. A technician services a walk-in freezer not reaching temperature with a heavily frosted evaporator. Which system should be checked first?

A. The static pressure measured across the supply air ductwork

B. The paint condition on the outdoor condensing unit cabinet

C. The defrost system and its defrost termination control

D. The colour code of the low-voltage control circuit wiring

110. A technician finds a fixed-orifice system short-cycling on the low-pressure control. Which cause is consistent with frequent low-pressure cutouts?

A. A low charge or a restriction lowering the suction pressure

B. The condenser being heavily oversized for the cooling load

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

D. The supply fan delivering excessive airflow to the conditioned space

111. A technician measures the three-phase voltages at a compressor and finds a notable imbalance between phases. Why is voltage imbalance a concern for the motor?

A. Imbalance automatically raises the refrigerant subcooling level

B. Imbalance lowers the refrigerant charge weight that is required

C. Voltage imbalance has no measurable effect on a three-phase motor

D. Imbalance causes excessive current and overheating of the windings

112. A technician services a system and suspects non-condensable gases are present. Where do these gases collect, and what symptom do they produce?

A. In the compressor crankcase, where they lower the oil level

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

C. In the evaporator coil, where they raise the cooling capacity

D. In the suction line, where they drive the superheat down to zero

113. A technician services a hermetic compressor that hums and trips after a few seconds. After confirming the capacitor is good, what should be checked next?

A. The slope of the condensate drain line leaving the coil pan

B. The static pressure measured at the system's return grille

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

D. The paint colour applied to the discharge line insulation

114. A technician adjusts a head-pressure control on a system operating in cold ambient conditions. What is the role of this control?

A. To maintain sufficient head pressure for proper TXV operation

B. To lower the suction pressure during the system's defrost cycle

C. To raise the evaporator superheat when the weather is mild

D. To weigh refrigerant into the system during the charging process

115. A technician measures an unusually high compressor discharge temperature during service. Which condition can contribute to an elevated discharge temperature?

A. An oversized condenser providing excessive liquid subcooling

B. A flooded evaporator returning liquid into the suction line

C. A system charged correctly and running at its design point

D. A low refrigerant charge or a high compression ratio

116. A technician notices oil staining around a fitting on the refrigerant circuit during a service visit. What does this oil residue most likely indicate?

A. The compressor crankcase has been overfilled with lubricating oil

B. The condenser is operating below its normal design subcooling

C. A refrigerant leak at that fitting carrying entrained oil with it

D. The evaporator superheat is set marginally above its target

117. A technician services a system and finds the condenser coil heavily fouled with dirt. Why must the condenser be cleaned during maintenance?

A. A dirty coil lowers the suction pressure below the freezing point

B. A dirty coil reduces heat rejection and raises the head pressure

C. A dirty coil reduces the refrigerant charge the system requires

D. A dirty coil increases the control transformer's output voltage

118. A technician services a control system and finds a defrost termination thermostat stuck closed so it never opens. What symptom results from this fault?

A. The system refuses to enter the defrost cycle at any time

B. The compressor trips immediately on high-pressure cutout

C. The evaporator subcools the liquid line far beyond normal

D. The defrost runs too long, wasting energy and adding heat

119. A technician suspects a reversing valve is leaking internally on a heat pump. Which symptom points to an internal leak in the valve?

A. Reduced capacity with the suction line warmer than expected

B. The suction line holding a perfectly normal temperature

C. The system reaching its full rated capacity faster than normal

D. The condenser fan motor drawing no measurable current at all

120. A technician must verify a thermistor temperature sensor during a control service call. How is a thermistor typically checked for proper function?

A. By weighing the refrigerant charge against the sensor's value

B. By reading the refrigerant pressure at the sensor's location

C. By measuring its resistance and comparing it to a temperature chart

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

121. A technician services a system that lost its charge and must select a replacement refrigerant for a retrofit. What is the primary concern in that selection?

A. Choosing whichever refrigerant happens to be cheapest in the shop

B. Compatibility with the existing oil, materials, and system design

C. Matching the new cylinder's colour to the original refrigerant

D. Selecting the refrigerant suited to the longest copper line run

122. A technician services a system with a TXV-fed evaporator that is starving for refrigerant. After ruling out the charge, what should be checked next?

A. The colour of the insulation wrapped on the suction line

B. The condenser fan blade pitch and its rotation direction

C. The duct static pressure measured at the supply register

D. The TXV, the sensing bulb, and any liquid line restriction

123. A technician completes a maintenance visit and documents all readings and work performed. Why is a complete service record an important professional practice?

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

B. It changes the type of refrigerant stored within the system

C. It removes the need to recover refrigerant on future visits

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

124. A technician services a system and must check the compressor current against the nameplate. A measured current well above the rated load amps suggests what?

A. The control transformer is supplying an excessive secondary voltage

B. The evaporator superheat has been set too high to draw current

C. An overloaded compressor, possibly from high head pressure

D. The system has been overcharged with lubricating oil only

125. A technician performs preventive maintenance and replaces a clogged liquid line filter-drier. Why is the system recovered before the drier is removed?

A. Recovery raises the suction pressure to ease the drier's removal

B. Recovery prevents refrigerant loss when the sealed line is opened

C. Recovery converts the refrigerant into a non-flammable type

D. Recovery changes the cylinder colour to match the new drier

Practice Exam 26: Answer Key and Explanations

1. C — Provide ventilation and remove or shield combustibles before open-flame work in a closed room. Brazing introduces both an ignition source and combustion products, so controlling ventilation and fuel sources addresses the dominant fire and air-quality hazards. This is the primary safety control whenever a torch is used in a confined space.

2. A — Section 8 of an SDS covers exposure controls and personal protection. It lists occupational exposure limits and the engineering controls and PPE needed to stay within them. Knowing this section lets the technician set up proper protection before handling the product.

3. D — Push rather than pull, keep the load low, and clear the path first. Pushing uses body weight safely and keeps the load in view, while a low centre of gravity and a clear path prevent tipping and trips. These practices reduce strain and loss-of-control injuries on rough ground.

4. B — Stop the unsafe practice and report the hazard per site procedure. A bypassed guard exposes the operator to amputation risk, and looking the other way normalizes the danger. Intervening and reporting is the responsibility of every worker on site.

5. A — Lockout/tagout isolates and secures energy sources so equipment cannot start. Locking the disconnect and tagging it prevents accidental or remote energizing while a technician is exposed. It is the fundamental protection against stored and electrical energy during service.

6. C — Cut resistance suited to sharp sheet-metal edges is the relevant glove property. The hazard from handling ductwork is laceration, not heat or chemicals, so the glove must resist cuts. Matching PPE to the actual hazard is the basis of correct selection.

7. D — A job briefing clarifies responsibilities and reduces errors and conflicts. Confirming each worker's role and understanding aligns the crew and prevents duplicated or missed tasks. Clear communication is central to safe, coordinated work.

8. B — Supply the circuit through a ground-fault circuit interrupter in a damp location. A GFCI detects current leaking to ground and trips quickly, protecting against shock where water raises the risk. It directly addresses the electrocution hazard of wet work areas.

9. A — Plan the route and sequence calls by priority and location. Organizing the day around urgency and geography minimizes travel time and ensures critical calls are met. Sound work organization improves both efficiency and service.

10. D — A flame-over-circle pictogram identifies an oxidizer that can intensify a fire. Oxidizers supply oxygen that accelerates combustion, so they must be kept away from fuels and ignition sources. Recognizing the pictogram guides safe storage and handling.

11. C — A working-alone procedure ensures a check-in system so help arrives if an incident occurs. The main risk of solo work is that an injured worker cannot summon aid, so scheduled contact provides the safety net. This is the core purpose of such procedures.

12. B — Contain the spill and use an appropriate absorbent material. Containment stops the spill from spreading or reaching drains, and absorbent allows safe collection and disposal. This protects the environment and prevents slip hazards.

13. A — A calibrated torque wrench set to the specified value provides correct measured tightening. It applies a precise, repeatable torque that prevents both under- and over-tightening. Accurate torque protects the joint and the component from failure.

14. D — Clear combustibles, place a heat shield, and stage an extinguisher before brazing indoors. This combination addresses ignition of nearby materials, protection of surfaces, and rapid response to any fire. Together they manage the fire risk of open-flame work in an occupied building.

15. B — Cut with a tubing cutter, ream the burr, clean, then braze. The cutter gives a square cut, reaming restores full bore, and cleaning enables the filler to wet the joint. This sequence produces a sound, full-flow brazed connection.

16. A — A phosphorus-bearing copper alloy is self-fluxing on copper-to-copper joints. The phosphorus reduces copper oxides as the joint heats, so no separate flux is needed. This makes copper-phosphorus rods the standard choice for copper refrigerant joints.

17. C — Use a tube bender that supports the wall through the radius. The bender prevents the soft copper from flattening or kinking as it forms the bend. Maintaining full bore keeps the line free of flow restriction.

18. A — A reducing coupling sized to match both tube diameters joins tubes of unequal size. It provides a proper brazeable socket for each diameter at the transition. This creates a sound, leak-tight connection between the different lines.

19. B — Dry nitrogen brought to the specified pressure with a leak check is the correct test method. Nitrogen is inert and dry, so it tests strength and tightness without contaminating the system. Shop air, refrigerant, and water are all unsuitable or unsafe for this purpose.

20. A — Label a recovered cylinder with refrigerant type, recovered status, and the appropriate hazard label. Accurate labelling prevents dangerous mixing and meets transport and regulatory requirements. It also identifies the contents for safe handling and reclaim.

21. C — Inadequate support causes sag that traps oil and stresses the brazed joints. Oil pooling in low spots starves the compressor and the strain can crack joints over time. Proper hanger spacing prevents both problems.

22. D — Install a grommet or sleeve to prevent abrasion where the line crosses a sheet-metal edge. Vibration against the sharp edge would otherwise wear through the tube and cause a leak. Protecting the contact point preserves the line's integrity.

23. B — Purging with dry nitrogen displaces moisture and debris from the interior of the line. Removing these contaminants before assembly protects the metering device and prevents acid formation. A clean, dry interior is essential for reliable operation.

24. A — Refrigerant records are required for regulatory leak-tracking and accurate service history. Logging quantities added reveals chronic leaks and satisfies environmental reporting rules. Documentation is both a legal duty and a diagnostic aid.

25. C — An adequate vapour barrier and R-value prevent condensation on a chilled-water line. The barrier stops moisture migration to the cold surface, and the R-value limits heat gain and sweating. This protects efficiency and prevents water damage in unconditioned spaces.

26. B — Skipping deburring leaves an internal burr that restricts flow and creates turbulence. The raised edge reduces the effective bore and disturbs refrigerant and oil flow. Reaming restores full flow area and protects downstream components.

27. D — Do not use a cylinder with an unreadable label; positively identify the contents first. Colour, pressure, and odour are all unreliable and unsafe means of identification. Verifying contents prevents dangerous cross-contamination and injury.

28. A — Vibration-isolating supports dampen vibration transmitted from the equipment into the structure. Isolating the line reduces transmitted noise and prevents fatigue at connections. This protects both occupant comfort and joint integrity.

29. C — A correct soldering flux cleans oxides and helps the solder wet the copper. Clean, oxide-free surfaces let capillary action draw the solder into the joint. Proper wetting produces a strong, leak-free connection.

30. B — Check delivered materials against the bill of materials or take-off list for the job. This confirms the correct items and quantities arrived before work proceeds. Catching shortages early prevents delays during the install.

31. D — Provide proper temporary task lighting before continuing the work. Poor lighting raises the risk of errors and injury and prevents proper inspection. Correcting the hazard first is the appropriate response.

32. A — Reinstall panels, clean the area, and inform the customer of the work performed. A safe, clean handover with a clear summary reflects professional conduct. Leaving panels off or departing silently is unsafe and unprofessional.

33. C — Suction line sizing must maintain velocity high enough to return oil up the riser. Too large a line drops velocity and lets oil log in the vertical run, starving the compressor. Sizing balances oil return against acceptable pressure drop.

34. D — The dominant load in a server room is the sensible heat rejected by the electronic equipment. Continuous equipment heat far exceeds occupant, solar, or infiltration gains in such a space. The cooling design must be sized to remove this steady internal load.

35. B — A control schematic lets the installer wire and verify the control circuit and its sequence correctly. It shows component connections and operating logic for installation and troubleshooting. Accurate wiring depends on following the schematic.

36. A — Static head from a tall liquid lift can cause flash gas if subcooling is low. Lifting liquid drops its pressure, and below saturation it boils into vapour at the metering device. Adequate subcooling must offset the lift to keep solid liquid feeding the valve.

37. C — The equal-friction method holds the friction loss per unit length constant throughout the ducts. Sizing each section to the same friction rate simplifies design and balances the system reasonably. It is a widely used duct-sizing approach.

38. D — Coil TD governs the humidity held in the space, affecting humidity-sensitive product. A higher TD removes more moisture, while a lower TD maintains higher humidity for product preservation. Selecting the right TD protects the stored product's condition.

39. A — Low-temperature refrigerant selection is driven by operating range, efficiency, oil compatibility, and regulations. The refrigerant must perform at the design temperatures, circulate the oil, and comply with environmental rules. These combined factors govern a sound, legal choice.

40. C — The nameplate MOP specifies the largest fuse or breaker permitted to protect the circuit. It caps overcurrent protection so the device trips before the equipment is damaged. Sizing protection to the MOP keeps the installation safe and code-compliant.

41. B — Condensing unit siting must allow clearance so discharge air is not recirculated into the coil. Recirculating hot discharge air raises condensing temperature and reduces capacity. Proper clearance protects performance.

42. D — High-efficiency furnace condensate is acidic and corrosive and must drain safely. The low-pH condensate can damage materials and drains if not handled per code, sometimes requiring neutralization. Proper disposal protects the building and the equipment.

43. A — An external equalizer compensates for evaporator pressure drop to control superheat accurately. It senses pressure at the coil outlet so the TXV responds to true outlet conditions rather than inlet pressure. This keeps superheat correct on coils with significant pressure drop.

44. C — A fire-rated floor penetration requires an approved firestop system that maintains the rating. The firestop reseals the opening so fire and smoke cannot pass through the assembly. Code requires restoring the rating at every penetration.

45. D — Accessible service ports allow safe gauge connection for service later. Planning their placement makes future charging and diagnostics practical without dismantling the system. Accessibility is a mark of good installation planning.

46. B — Insulation that is too thin allows heat gain and surface condensation on the cold line. The cold surface then sweats and absorbs heat that lowers efficiency. Adequate thickness prevents both energy loss and water damage.

47. A — Automatic air vents belong at the system's high points where air naturally collects. Air rises and accumulates at the peaks, blocking flow and reducing heat transfer if not released. Venting at high points keeps the loop circulating fully.

48. C — Excess voltage drop on a long control run can prevent relays and contactors from pulling in. Resistance over distance lowers the voltage at the load below the level needed to operate. Correct wire size maintains reliable control signalling.

49. D — Coastal high-wind installation requires wind-load restraint and tie-downs rated for the design wind speed. Unrestrained rooftop equipment can shift or blow off in high winds. Proper anchoring keeps the equipment secure and safe.

50. B — A zeotropic blend must be handled by accounting for glide using its correct dew and bubble points. Glide means the blend evaporates and condenses across a temperature range, so superheat and subcooling reference different saturation points. Using the proper points ensures accurate control and charging.

51. D — A steady nitrogen hold overnight confirms the field-brazed joints are leak-tight at the test pressure. No pressure loss over time means no measurable leak in the assembled circuit. This pressure test must pass before evacuation and charging.

52. A — A micron reading that rises and then stabilizes indicates moisture off-gassing under vacuum. Remaining water boils into vapour and raises the pressure until it reaches equilibrium, unlike a leak that rises without limit. The stabilizing level signals moisture rather than a leak.

53. C — Mount the TXV sensing bulb on a clean horizontal suction line with firm thermal contact. Good contact at the evaporator outlet lets the bulb sense true outlet temperature for accurate superheat control. Poor placement causes hunting or improper feeding.

54. B — Flowing dry nitrogen during brazing prevents internal oxide scale from forming inside the tubing. Without it, heated copper forms cupric oxide flakes that circulate and clog the TXV and drier. Purging keeps the internal surfaces clean.

55. D — The arrow on a filter-drier shows refrigerant flow direction for proper filtering. Installed backward, the drier cannot trap moisture and debris effectively and may release captured material. Correct orientation ensures it protects the system.

56. C — A zeotropic blend must be drawn as liquid because vapour draw causes fractionation. The components boil off at different rates, so removing vapour shifts the blend composition. Charging liquid preserves the intended refrigerant mixture.

57. A — Reverse rotation produces no pumping and can damage the scroll set, so rotation must be verified. A scroll compressor run backward quickly overheats and fails. Confirming phase sequence at startup protects the compressor.

58. D — A suction-line accumulator protects the compressor against liquid refrigerant slugging back. It holds liquid and meters it back as vapour so only gas reaches the compressor. This prevents the mechanical damage that liquid slugs cause.

59. B — A flexible canvas connector isolates fan vibration from being transmitted into the duct. Breaking the rigid path stops noise and fatigue from reaching the ductwork. This improves comfort and protects connections.

60. C — A P-trap on a draw-through air handler maintains a seal against the negative pan pressure. Without the trap, the fan's suction would hold condensate in the pan or pull air through the drain. The trap allows condensate to drain freely.

61. A — A correctly formed flare torqued to the manufacturer's value seals reliably under pressure. The flare must seat fully against the fitting at the specified torque to hold. Cracks, wrong angles, or over-torque all compromise the seal.

62. D — A low-ambient head-pressure control maintains adequate head pressure for proper TXV feed. Low condensing pressure in cold weather starves the valve and cuts capacity. The control keeps the high side pressure high enough to feed liquid.

63. B — Forming a trap at the base of a suction riser and sizing for adequate velocity aids oil return. The trap collects oil so refrigerant velocity can carry it up the riser. This prevents oil logging and lubrication loss at the compressor.

64. A — The control transformer in the furnace cabinet supplies the 24-volt control power. It steps the line voltage down to operate the thermostat, relays, and contactor coil. It is the source of the low-voltage control supply.

65. C — Place spring or pad isolators between the unit and the steel structure for vibration isolation. The isolators absorb operating vibration so it does not transmit into the building. This reduces noise and structural fatigue.

66. D — A stream of bubbles in the sight glass during steady operation indicates a low charge or restriction producing flash gas. Vapour in the liquid line shows the refrigerant is not fully subcooled liquid. It signals a charge or flow problem to investigate.

67. B — A fire-rated wall penetration requires an approved firestop system rated to match the assembly. The firestop reseals the opening so fire and smoke cannot spread through it. Code requires maintaining the wall's rating at the penetration.

68. A — A reversing valve reverses refrigerant flow to switch the system between heating and cooling. Its piping determines which coil acts as condenser or evaporator in each mode. Correct installation enables proper heat pump operation.

69. C — Significantly over-torquing a flare nut can split or deform the flare, creating a leak. Excess force cracks the copper rather than improving the seal. Following the data-plate torque produces a reliable, leak-free joint.

70. D — The curb's weather seal prevents water leakage into the building below. It keeps the roof watertight where the unit and ducts penetrate the assembly. A proper seal is essential to a sound rooftop installation.

71. B — On a critically charged system, the manufacturer specifies an exact charge that weighing achieves. Weighing in the stated amount removes guesswork and ensures correct performance. Accurate charge protects capacity and the compressor.

72. A — A condensate pump installation must include a float switch that interrupts cooling if the pump fails. This prevents overflow and water damage when the pump cannot clear the water. The interlock is a required safety on gravity-drainless setups.

73. C — Galvanic corrosion can occur at the junction of dissimilar metals, so it needs special attention. An electrolytic reaction between unlike metals attacks the joint over time. Proper material selection or isolation prevents premature failure.

74. D — Each thermostat stage's wiring is verified to confirm it energizes the correct equipment in order. Correct staging ensures capacity steps activate as the load rises. Verification catches miswiring before the system is left running.

75. B — Poor thermal contact between sensor and pipe causes inaccurate readings and faulty control action. An air gap lets the sensor read ambient instead of pipe temperature. Firm contact ensures the control responds to true conditions.

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

77. C — Low superheat with a cold, sweating suction line indicates the metering device is overfeeding and the coil may be flooding. Excess liquid leaves the evaporator without fully boiling, chilling the suction line. Flooding risks liquid return and compressor damage.

78. D — Very low subcooling on a hot day suggests the system is undercharged or has insufficient liquid feed. Too little refrigerant leaves little liquid backed up in the condenser to subcool. The reading points to a charge or feed deficiency.

79. B — A 22°C drop at rated airflow is too low an airflow for the coil's capacity at this condition. With insufficient air moving across the coil, each unit of air is overcooled, exaggerating the split. Restoring airflow brings the temperature drop back to normal.

80. A — Turn the adjustment stem to increase the valve's spring pressure to raise operating superheat. More spring force requires more superheat before the TXV opens. This tunes the coil's superheat to the target value.

81. C — Airflow is found from the heater output, the temperature rise, and a constant (the sensible heat equation). With a known heater output and measured rise, the equation is rearranged to solve for airflow. This is a standard field method for verifying air volume.

82. D — Each blend has its own unique pressure-temperature relationship, so the specific chart is required. Using the wrong chart misreads saturation and leads to charging errors, and blends also have glide. The correct chart is essential for accurate readings.

83. A — A typical timed electric defrost is initiated by a timer or demand control and ended by temperature or time. Initiation clears coil frost on schedule, and termination ends it once the coil clears. Proper defrost control maintains low-temperature capacity.

84. C — Compressor amperage well above nameplate RLA indicates an overloaded compressor, possibly from high head pressure. Excess load draws more current and risks overheating and tripping. The reading flags a high-side or mechanical problem.

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

86. D — A high-pressure cutout opens the control circuit to stop the compressor and prevent damage. Cutting power when pressure reaches the setpoint protects against overpressure and rupture. It is a critical safety device.

87. A — An economizer provides free cooling using suitable outdoor air when conditions allow. Modulating dampers bring in cool outside air to reduce mechanical cooling. Confirming damper operation verifies the energy-saving function works.

88. C — A documented baseline provides a reference for diagnosing later performance changes. Comparing future readings to the recorded baseline reveals developing faults. Documentation turns commissioning into an ongoing diagnostic tool.

89. D — Correct reversing valve operation is confirmed when the refrigerant flow switches 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.

90. B — Air pockets reduce heat transfer and impede water circulation, so trapped air must be bled. The pockets insulate the coil surface and block flow in a hydronic loop. Venting restores full coil capacity.

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

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

93. D — A clear sight glass with normal subcooling indicates the charge appears adequate with solid liquid reaching the valve. Subcooled liquid and no bubbles show the high side is supplying full liquid. It is a good sign of proper charge.

94. B — Wet-bulb and dry-bulb supply temperatures determine 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.

95. A — Restricted condenser airflow most directly causes elevated head pressure and increased compressor load. Poor heat rejection forces a higher condensing temperature and pressure. This stresses the compressor and lowers efficiency.

96. C — Correct drain slope ensures condensate flows away and does not pool in the pan. Standing water breeds microbial growth and can overflow into the building. Proper slope provides continuous drainage.

97. B — Verifying staged operation confirms capacity stages energize correctly under rising load. Each stage must activate in turn so the system matches output to demand. Confirming this at commissioning ensures proper staged control.

98. D — High superheat with low subcooling and weak cooling points to an undercharged system. Too little refrigerant starves the evaporator and leaves little subcooling at the condenser. Restoring the charge level corrects the capacity loss.

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

100. C — Refrigerant must be recovered into an approved cylinder rather than vented to atmosphere. Environmental regulations prohibit venting to prevent atmospheric release. Recovery is the only compliant way to empty a system.

101. B — An iced-up evaporator is most often caused by low airflow from a dirty filter or failing blower. Reduced airflow drops the coil below freezing and frost accumulates. Restoring airflow is the first corrective step.

102. D — A winding-to-frame reading near zero ohms indicates the winding is grounded due to failed insulation. The short to the frame means the insulation has broken down. Such a motor is faulty and unsafe to operate.

103. A — With 24 volts at the coil but no pull-in, the contactor coil is open or the mechanism has failed. Voltage is reaching the coil, so the fault lies in the coil or contactor itself. Replacing the contactor restores operation.

104. C — A run capacitor failed open will most likely cause the motor to fail to start, hum, and 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.

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

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

107. A — 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.

108. D — A slow leak is located using an electronic detector, bubble solution, or UV dye. These methods reliably find refrigerant escaping from joints and components. Adding refrigerant or guessing wastes refrigerant and finds nothing.

109. C — 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.

110. A — Frequent low-pressure cutouts on a fixed-orifice system are consistent with a low charge or a restriction lowering suction pressure. Too little refrigerant reaching the coil drops suction below the control setpoint. Checking charge and restrictions addresses the cause.

111. D — Voltage imbalance causes excessive current and overheating of the motor windings. A small voltage imbalance produces a much larger current imbalance in the windings. This overheats the motor and shortens its life.

112. B — Non-condensable gases collect in the condenser and high side, raising head pressure abnormally. Because they do not condense, they occupy condenser volume and add partial pressure. The elevated head pressure signals their presence and cuts efficiency.

113. C — A humming compressor that trips after a few seconds, with a good capacitor, calls for checking the start components, windings, and for a seized rotor. A mechanical seizure or winding fault also prevents starting. These checks isolate the cause.

114. A — 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.

115. D — A low refrigerant charge or a high compression ratio can raise the discharge temperature. Less refrigerant means less cooling of the compressor and hotter discharge gas. Excessive discharge temperature breaks down oil and damages the compressor.

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

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

118. D — A defrost termination thermostat stuck closed lets the defrost run too long, wasting energy and adding heat. The cycle should end when the coil clears, but a stuck-closed control keeps heating. This wastes energy and can raise box temperature.

119. A — 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.

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

121. B — Retrofit refrigerant selection must ensure compatibility with the existing oil, materials, and system design. The wrong refrigerant can attack seals or fail to circulate the oil. Compatibility ensures a safe, reliable retrofit.

122. D — On a starving TXV-fed evaporator, after ruling out charge, check the TXV, the 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.

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

124. C — Compressor current well above rated load amps suggests an overloaded compressor, possibly from high head pressure. Excess mechanical or pressure load draws more current and risks tripping. The reading flags a high-side or mechanical fault to investigate.

125. B — The system is recovered before the drier is removed to prevent refrigerant loss when the sealed line is opened. Opening a charged line would vent refrigerant illegally and lose the charge. Recovery makes the repair clean and compliant.