PRACTICE EXAM 21: PLUMBER RED SEAL SIMULATION (125 QUESTIONS)

This simulation contains 125 questions with one correct answer among four choices. The official Red Seal Plumber exam uses a 70% pass mark and a four-hour writing period. Use the formula sheet and acronym list supplied with the official exam when applicable. Read each question carefully, select the best answer, and review your work before submitting.

1. [Simulation 21] Which practice most directly reduces injury risk when cutting metallic pipe with a powered tool?

A. Hold the pipe by hand and remove the guard
B. Use a larger blade without checking its rating
C. Stand in line with the blade and increase feed force
D. Secure the work, use the specified guard, and wear suitable eye protection

2. [Simulation 21] Why should a plumber inspect a hand tool before putting it into service?

A. Inspection makes every tool suitable for every material
B. Inspection replaces the need for personal protective equipment
C. A damaged tool can fail unexpectedly and produce an uncontrolled result
D. Inspection guarantees that a tool never needs maintenance

3. [Simulation 21] Which housekeeping action is most important after cutting and threading pipe?

A. Leave debris until the entire project is complete
B. Sweep debris toward an open drain
C. Cover the debris with cardboard and continue
D. Remove chips, oil, and off-cuts from walking and work surfaces

4. [Simulation 21] Why should a plumber inspect a hand tool before putting it into service?

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9. [Simulation 21] Why should a plumber inspect a hand tool before putting it into service?

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10. [Simulation 21] Which housekeeping action is most important after cutting and threading pipe?

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D. Cover the debris with cardboard and continue

11. [Simulation 21] A 5.6 m metal run changes temperature by 35°C. If expansion is 0.05 mm per metre per °C, what is the calculated expansion?

A. 9.80 mm
B. 11.80 mm
C. 4.90 mm
D. 14.80 mm

12. [Simulation 21] Which housekeeping action is most important after cutting and threading pipe?

A. Leave debris until the entire project is complete
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C. Cover the debris with cardboard and continue
D. Remove chips, oil, and off-cuts from walking and work surfaces

13. [Simulation 21] Which practice most directly reduces injury risk when cutting metallic pipe with a powered tool?

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14. [Simulation 21] Why should a plumber inspect a hand tool before putting it into service?

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15. [Simulation 21] What is the purpose of cleaning a copper tube and fitting before soldering?

A. It cools the joint below room temperature
B. It removes oxides and contamination so solder can wet the prepared surfaces
C. It adds a permanent mechanical thread
D. It eliminates the need to heat the fitting evenly

16. [Simulation 21] What should be checked before using a solvent-cement system on plastic pipe?

A. Material compatibility, surface preparation, and the cement's working time
B. Only the color of the pipe
C. Whether the joint can be assembled dry
D. Whether the pipe can be heated until it softens

17. [Simulation 21] Why is deburring the inside of a cut pipe important before assembly?

A. It increases the outside diameter for a tighter fit
B. It replaces cleaning and solvent preparation
C. It hardens the pipe so joining heat is unnecessary
D. It restores a smooth bore and reduces damage to seals or flow disturbance

18. [Simulation 21] What should be checked before using a solvent-cement system on plastic pipe?

A. Only the color of the pipe
B. Whether the joint can be assembled dry
C. Whether the pipe can be heated until it softens
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C. It restores a smooth bore and reduces damage to seals or flow disturbance
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20. [Simulation 21] When making a threaded joint, which approach best limits the chance of a leak?

A. Use compatible sealant, start the threads square, and tighten without over-torquing
B. Cross-thread the fitting and compensate with extra tape
C. Use sealant that is incompatible with the service fluid

D. Tighten until the fitting cracks slightly

21. [Simulation 21] Why are pipe supports installed before a long run is pressure tested?

A. Supports make the test pressure higher
B. Supports control movement and prevent temporary test loads from distorting the run
C. Supports replace isolation valves
D. Supports eliminate the need to inspect joints

22. [Simulation 21] When making a threaded joint, which approach best limits the chance of a leak?

A. Use compatible sealant, start the threads square, and tighten without over-torquing
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23. [Simulation 21] A pipe assembly requires 3.45 m between reference points. One fitting has a 0.06 m takeoff. What cut length is required before joining?

A. 3.45 m
B. 3.39 m
C. 3.51 m
D. 3.33 m

24. [Simulation 21] What is the purpose of cleaning a copper tube and fitting before soldering?

A. It cools the joint below room temperature
B. It adds a permanent mechanical thread
C. It eliminates the need to heat the fitting evenly
D. It removes oxides and contamination so solder can wet the prepared surfaces

25. [Simulation 21] What should be checked before using a solvent-cement system on plastic pipe?

A. Only the color of the pipe
B. Whether the joint can be assembled dry
C. Material compatibility, surface preparation, and the cement's working time
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26. [Simulation 21] What is the purpose of cleaning a copper tube and fitting before soldering?

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27. [Simulation 21] What should be checked before using a solvent-cement system on plastic pipe?

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C. Material compatibility, surface preparation, and the cement's working time
D. Whether the pipe can be heated until it softens

28. [Simulation 21] Why is a drainage pipe given a designed grade?

A. The grade creates potable-water pressure
B. The grade provides gravity flow while helping carry solids through the pipe
C. The grade sterilizes wastewater
D. The grade makes venting unnecessary

29. [Simulation 21] In wastewater treatment, what is the main role of screening at the inlet?

A. It adds disinfectant to every discharge
B. It raises the biological oxygen demand
C. It replaces all later treatment stages
D. It removes larger debris before downstream treatment equipment

30. [Simulation 21] Why does a drainage stack need suitable venting?

A. Venting stabilizes pressure and protects trap seals as fixtures discharge
B. Venting supplies hot water to every fixture
C. Venting replaces the building sewer
D. Venting makes cleanouts unnecessary

31. [Simulation 21] In wastewater treatment, what is the main role of screening at the inlet?

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A. Venting supplies hot water to every fixture
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33. [Simulation 21] Why should drainage piping be protected from excessive deflection between supports?

A. Deflection improves self-scouring in every pipe
B. Deflection can change grade, retain solids, and stress joints

C. Deflection replaces required cleanouts
D. Deflection raises the potable-water pressure

34. [Simulation 21] Why is a drainage pipe given a designed grade?

A. The grade creates potable-water pressure
B. The grade sterilizes wastewater
C. The grade makes venting unnecessary
D. The grade provides gravity flow while helping carry solids through the pipe

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48. [Simulation 21] Approximately how much water is held in a 5.1 m pipe with a 0.05 m internal diameter? Use $\pi = 3.1416$ and express the result in litres.

A. 10.01 L
B. 20.02 L
C. 5.00 L
D. 13.01 L

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60. [Simulation 21] Why is a curb stop or service shutoff valuable on a water service?

A. It permits the service to be isolated for repair or emergency work
B. It aerates the building drain
C. It measures water quality without sampling
D. It eliminates the need for interior shutoffs

61. [Simulation 21] Why is an expansion-control device used on a closed water-heating system?

A. It removes sediment from the cold-water service
B. It substitutes for a temperature control
C. It provides a place for heated water to expand and limits pressure rise
D. It increases the burner input automatically

62. [Simulation 21] In a private well system, what does the pressure tank primarily provide?

A. It stores pressurized water and reduces frequent pump cycling
B. It treats every biological contaminant
C. It replaces the well pump motor
D. It vents the building drainage system

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74. [Simulation 21] A fixture discharges 33 L in 30 seconds. What is the average flow rate?

A. 0.55 L/s
B. 1.10 L/s
C. 990.00 L/s
D. 1.16 L/s

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A. It treats every biological contaminant
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84. [Simulation 21] What is the purpose of an air gap or equivalent separation at a discharge?

A. It increases the drain's carrying capacity indefinitely
B. It prevents contaminated water from being siphoned back into the supply
C. It softens all incoming water

D. It raises the fixture's operating temperature

85. [Simulation 21] Why is a carbon filter commonly used in point-of-use treatment?

A. It reliably removes all hardness ions
B. It sterilizes every flow without contact control
C. It increases water pressure through the cartridge
D. It can reduce selected tastes, odors, and organic compounds by adsorption

86. [Simulation 21] Why is a fixture shutoff valve installed at an individual connection?

A. It converts wastewater into potable water
B. It allows the fixture to be serviced without shutting down the whole building
C. It sets every branch pressure automatically
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89. [Simulation 21] What does an ion-exchange softener primarily remove from hard water?

A. All microorganisms without regeneration
B. Suspended sand without a filter bed
C. Calcium and magnesium ions that contribute to scale formation
D. Dissolved oxygen by heating alone

90. [Simulation 21] What is the main treatment mechanism of ultraviolet disinfection?

A. It removes grit by settling
B. It exchanges sodium for hardness ions
C. Ultraviolet energy damages microorganisms so they cannot reproduce effectively
D. It raises alkalinity through heating

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101. [Simulation 21] Why is an expansion tank connected to a closed hydronic system?

A. It absorbs water-volume changes as the system temperature changes
B. It filters combustion products
C. It supplies makeup fuel
D. It replaces every pressure-relief device

102. [Simulation 21] Why are hydronic zones balanced after installation?

A. Balancing increases fuel pressure in the burner
B. Balancing removes the need for a thermostat
C. Balancing makes every circuit identical in length
D. Balancing distributes design flow so connected spaces receive appropriate heat

103. [Simulation 21] What is a common purpose of a thermostatic mixing valve in a hydronic or domestic hot-water application?

A. It separates all air from the boiler water
B. It increases the pump motor speed directly
C. It blends hot and cooler water to deliver a controlled outlet temperature
D. It replaces the system isolation valves

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110. [Simulation 21] Using Q = 4.19 × flow × temperature difference, what heat transfer corresponds to 0.61 L/s and a 20°C temperature difference?

A. 25.56 kW
B. 51.12 kW
C. 61.12 kW
D. 83.80 kW

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B. It increases the pump motor speed directly
C. It blends hot and cooler water to deliver a controlled outlet temperature
D. It replaces the system isolation valves

113. [Simulation 21] Why is an expansion tank connected to a closed hydronic system?

A. It absorbs water-volume changes as the system temperature changes
B. It filters combustion products
C. It supplies makeup fuel
D. It replaces every pressure-relief device

114. [Simulation 21] Why are hydronic zones balanced after installation?

A. Balancing increases fuel pressure in the burner
B. Balancing removes the need for a thermostat

C. Balancing makes every circuit identical in length
D. Balancing distributes design flow so connected spaces receive appropriate heat

115. [Simulation 21] What is a common purpose of a thermostatic mixing valve in a hydronic or domestic hot-water application?

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116. [Simulation 21] Why are hydronic zones balanced after installation?

A. Balancing distributes design flow so connected spaces receive appropriate heat
B. Balancing increases fuel pressure in the burner
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D. Balancing makes every circuit identical in length

117. [Simulation 21] Why should a process line be flushed before sensitive equipment is placed in service?

A. Flushing increases the design pressure permanently
B. Flushing removes construction debris and residue that could damage equipment
C. Flushing replaces required leak testing
D. Flushing makes incompatible materials safe

118. [Simulation 21] Why is flow direction marked on many specialized valves and components?

A. The internal design may perform correctly only when installed in the intended direction
B. The marking identifies the pipe manufacturer only
C. The marking eliminates the need for supports

D. The marking guarantees the fluid is potable

119. [Simulation 21] Why should a process line be flushed before sensitive equipment is placed in service?

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120. [Simulation 21] Why is flow direction marked on many specialized valves and components?

A. The marking identifies the pipe manufacturer only
B. The marking eliminates the need for supports
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121. [Simulation 21] Why should a process line be flushed before sensitive equipment is placed in service?

A. Flushing increases the design pressure permanently
B. Flushing removes construction debris and residue that could damage equipment
C. Flushing replaces required leak testing
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122. [Simulation 21] A process solution is prepared from 31 L of stock material at 20% of the final volume. What stock volume is needed?

A. 24.80 L
B. 155.00 L
C. 31.20 L

D. 6.20 L

123. [Simulation 21] Why should a process line be flushed before sensitive equipment is placed in service?

A. Flushing increases the design pressure permanently
B. Flushing replaces required leak testing
C. Flushing removes construction debris and residue that could damage equipment
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124. [Simulation 21] Why is flow direction marked on many specialized valves and components?

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125. [Simulation 21] Why should a process line be flushed before sensitive equipment is placed in service?

A. Flushing removes construction debris and residue that could damage equipment
B. Flushing increases the design pressure permanently
C. Flushing replaces required leak testing
D. Flushing makes incompatible materials safe

Practice Exam 21: Answer Key and Explanations

1. D — The correct answer is Secure the work, use the specified guard, and wear suitable eye protection. Securing the work and using the guarded tool as designed controls movement and flying debris. The other choices fail because they remove or ignore controls intended to contain the cutting hazard. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

2. C — The correct answer is A damaged tool can fail unexpectedly and produce an uncontrolled result. Pre-use inspection identifies damage, missing guards, and conditions that could cause failure. The other choices fail because they claim benefits that inspection cannot provide. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

3. D — The correct answer is Remove chips, oil, and off-cuts from walking and work surfaces. Removing sharp waste and slippery residue prevents trips, punctures, and contamination. The other choices fail because they leave the hazard in place or move it into another system. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

4. B — The correct answer is A damaged tool can fail unexpectedly and produce an uncontrolled result. Pre-use inspection identifies damage, missing guards, and conditions that could cause failure. The other choices fail because they claim benefits that inspection cannot provide. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

5. A — The correct answer is Remove chips, oil, and off-cuts from walking and work surfaces. Removing sharp waste and slippery residue prevents trips, punctures, and contamination. The other choices fail because they leave the hazard in place or move it into another system. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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11. A — The correct answer is 9.80 mm. Expansion is calculated by multiplying length, temperature change, and the material expansion rate. The other choices fail because they use an incorrect factor or omit one of the three required quantities. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

12. D — The correct answer is Remove chips, oil, and off-cuts from walking and work surfaces. Removing sharp waste and slippery residue prevents trips, punctures, and contamination. The other choices fail because they leave the hazard in place or move it into another system. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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15. B — The correct answer is It removes oxides and contamination so solder can wet the prepared surfaces. Clean, oxide-free surfaces allow flux and solder to form a continuous bonded joint. The other choices fail because they describe cooling, threading, or skipping controlled heating. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

16. A — The correct answer is Material compatibility, surface preparation, and the cement's working time. A compatible system and prepared surfaces are necessary for a reliable solvent-welded joint. The other choices fail because they ignore compatibility or substitute an unsafe joining method. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

17. D — The correct answer is It restores a smooth bore and reduces damage to seals or flow disturbance. Deburring removes the sharp internal lip created by cutting and protects the joint components. The other choices fail because they assign deburring an effect it cannot provide. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

18. D — The correct answer is Material compatibility, surface preparation, and the cement's working time. A compatible system and prepared surfaces are necessary for a reliable solvent-welded joint. The other choices fail because they ignore compatibility or substitute an unsafe joining method. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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20. A — The correct answer is Use compatible sealant, start the threads square, and tighten without over-torquing. Square engagement and compatible sealant protect the threads while preserving fitting integrity. The other choices fail because they create damaged threads, chemical incompatibility, or structural damage. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

21. B — The correct answer is Supports control movement and prevent temporary test loads from distorting the run. A supported run maintains alignment and transfers loads safely during testing and service. The other choices fail because they assign supports a pressure or inspection function they do not have. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

22. A — The correct answer is Use compatible sealant, start the threads square, and tighten without over-torquing. Square engagement and compatible sealant protect the threads while preserving fitting integrity. The other choices fail because they create damaged threads, chemical incompatibility, or structural damage. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

23. B — The correct answer is 3.39 m. The cut length is the reference distance minus the fitting takeoff that will occupy part of the assembly. The other choices fail because they fail to subtract the takeoff or subtract it the wrong number of times. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

24. D — The correct answer is It removes oxides and contamination so solder can wet the prepared surfaces. Clean, oxide-free surfaces allow flux and solder to form a continuous bonded joint. The other choices fail because they describe cooling, threading, or skipping controlled heating. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

25. C — The correct answer is Material compatibility, surface preparation, and the cement's working time. A compatible system and prepared surfaces are necessary for a reliable solvent-welded joint. The other choices fail because they ignore compatibility or substitute an unsafe joining method. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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27. C — The correct answer is Material compatibility, surface preparation, and the cement's working time. A compatible system and prepared surfaces are necessary for a reliable solvent-welded joint. The other choices fail because they ignore compatibility or substitute an unsafe joining method. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

28. B — The correct answer is The grade provides gravity flow while helping carry solids through the pipe. Gravity drainage depends on a coordinated slope, flow path, and vented system. The other choices

fail because they assign slope a water-supply, treatment, or venting function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

29. D — The correct answer is It removes larger debris before downstream treatment equipment. Screening protects pumps and process equipment by intercepting coarse material early. The other choices fail because they describe chemical dosing, pollution loading, or an impossible replacement of treatment. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

30. A — The correct answer is Venting stabilizes pressure and protects trap seals as fixtures discharge. Air movement limits pressure fluctuations that could siphon or blow out trap seals. The other choices fail because they give venting a supply, sewer, or maintenance function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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33. B — The correct answer is Deflection can change grade, retain solids, and stress joints. Maintaining the designed line and grade supports dependable drainage and joint performance. The other choices fail because they treat deformation as beneficial or connect it to unrelated systems. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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48. A — The correct answer is 10.01 L. The internal volume is the circular area multiplied by length, with cubic metres converted to litres. The other choices fail because they use diameter as the radius, omit the area relationship, or apply the wrong conversion. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

49. D — The correct answer is Deflection can change grade, retain solids, and stress joints. Maintaining the designed line and grade supports dependable drainage and joint performance. The other choices fail because they treat deformation as beneficial or connect it to unrelated systems. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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51. C — The correct answer is Deflection can change grade, retain solids, and stress joints. Maintaining the designed line and grade supports dependable drainage and joint performance. The other choices fail because they treat deformation as beneficial or connect it to unrelated systems. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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60. A — The correct answer is It permits the service to be isolated for repair or emergency work. A service shutoff gives operators a controlled isolation point outside or near the building. The other choices fail because they assign it a drainage, testing, or fixture-isolation function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

61. C — The correct answer is It provides a place for heated water to expand and limits pressure rise. Heating raises water volume and pressure in a closed system, so expansion must be accommodated. The other choices fail because they confuse expansion control with filtration, temperature control, or combustion. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

62. A — The correct answer is It stores pressurized water and reduces frequent pump cycling. The tank supplies a drawdown volume and cushions the pump control cycle. The other choices fail because they

confuse storage with treatment, pumping, or drainage venting. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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73. A — The correct answer is It provides a place for heated water to expand and limits pressure rise. Heating raises water volume and pressure in a closed system, so expansion must be accommodated. The other choices fail because they confuse expansion control with filtration, temperature control, or combustion. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

74. B — The correct answer is 1.10 L/s. Average flow rate equals discharged volume divided by elapsed time, with the units kept as litres per second. The other choices fail because they divide in the wrong direction, double the time, or multiply quantities that should be divided. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

75. D — The correct answer is It provides a place for heated water to expand and limits pressure rise. Heating raises water volume and pressure in a closed system, so expansion must be accommodated. The other choices fail because they confuse expansion control with filtration, temperature control, or combustion. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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77. B — The correct answer is It permits the service to be isolated for repair or emergency work. A service shutoff gives operators a controlled isolation point outside or near the building. The other choices fail because they assign it a drainage, testing, or fixture-isolation function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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choices fail because they assign it a drainage, testing, or fixture-isolation function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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83. C — The correct answer is It stores pressurized water and reduces frequent pump cycling. The tank supplies a drawdown volume and cushions the pump control cycle. The other choices fail because they confuse storage with treatment, pumping, or drainage venting. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

84. B — The correct answer is It prevents contaminated water from being siphoned back into the supply. Physical separation protects the potable supply when the receiving drain or vessel becomes contaminated. The other choices fail because they confuse cross-connection protection with drainage capacity, softening, or heating. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

85. D — The correct answer is It can reduce selected tastes, odors, and organic compounds by adsorption. Activated carbon provides adsorption for certain contaminants, but performance depends on the media and service conditions. The other choices fail because they claim universal softening, guaranteed sterilization, or pressure increase. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

86. B — The correct answer is It allows the fixture to be serviced without shutting down the whole building. Local isolation limits disruption and makes routine service safer and faster. The other choices fail because they assign the valve a treatment, pressure-control, or drainage function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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89. C — The correct answer is Calcium and magnesium ions that contribute to scale formation. The resin exchanges hardness ions for other ions and must be regenerated as capacity is used. The other choices fail because they describe disinfection, sediment filtration, or oxygen removal. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

90. C — The correct answer is Ultraviolet energy damages microorganisms so they cannot reproduce effectively. UV acts on microorganisms and depends on adequate dose, lamp condition, and water clarity. The other choices fail because they describe sediment separation, softening, or chemical adjustment. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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92. D — The correct answer is Ultraviolet energy damages microorganisms so they cannot reproduce effectively. UV acts on microorganisms and depends on adequate dose, lamp condition, and water clarity. The other choices fail because they describe sediment separation, softening, or chemical adjustment. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

93. B — The correct answer is It prevents contaminated water from being siphoned back into the supply. Physical separation protects the potable supply when the receiving drain or vessel becomes contaminated. The other choices fail because they confuse cross-connection protection with drainage capacity, softening, or heating. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

94. D — The correct answer is It can reduce selected tastes, odors, and organic compounds by adsorption. Activated carbon provides adsorption for certain contaminants, but performance depends on the media and service conditions. The other choices fail because they claim universal softening, guaranteed sterilization, or pressure increase. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

95. A — The correct answer is It prevents contaminated water from being siphoned back into the supply. Physical separation protects the potable supply when the receiving drain or vessel becomes contaminated. The other choices fail because they confuse cross-connection protection with drainage

capacity, softening, or heating. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

96. C — The correct answer is It can reduce selected tastes, odors, and organic compounds by adsorption. Activated carbon provides adsorption for certain contaminants, but performance depends on the media and service conditions. The other choices fail because they claim universal softening, guaranteed sterilization, or pressure increase. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

97. B — The correct answer is It allows the fixture to be serviced without shutting down the whole building. Local isolation limits disruption and makes routine service safer and faster. The other choices fail because they assign the valve a treatment, pressure-control, or drainage function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

98. C — The correct answer is Calcium and magnesium ions that contribute to scale formation. The resin exchanges hardness ions for other ions and must be regenerated as capacity is used. The other choices fail because they describe disinfection, sediment filtration, or oxygen removal. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

99. B — The correct answer is It allows the fixture to be serviced without shutting down the whole building. Local isolation limits disruption and makes routine service safer and faster. The other choices fail because they assign the valve a treatment, pressure-control, or drainage function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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101. A — The correct answer is It absorbs water-volume changes as the system temperature changes. A diaphragm or bladder expansion tank limits pressure swings caused by thermal expansion. The other choices fail because they confuse hydronic expansion with combustion, fuel, or relief protection. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

102. D — The correct answer is Balancing distributes design flow so connected spaces receive appropriate heat. Flow balancing addresses distribution and comfort without changing the basic system layout. The other choices fail because they confuse hydraulic balancing with combustion, control, or geometry. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

103. C — The correct answer is It blends hot and cooler water to deliver a controlled outlet temperature. Mixing controls delivery temperature and can reduce scald risk when selected and adjusted correctly. The other choices fail because they confuse temperature mixing with air removal, motor control, or isolation. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

104. A — The correct answer is Balancing distributes design flow so connected spaces receive appropriate heat. Flow balancing addresses distribution and comfort without changing the basic system layout. The other choices fail because they confuse hydraulic balancing with combustion, control, or geometry. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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109. A — The correct answer is Balancing distributes design flow so connected spaces receive appropriate heat. Flow balancing addresses distribution and comfort without changing the basic system layout. The other choices fail because they confuse hydraulic balancing with combustion, control, or geometry. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

110. B — The correct answer is 51.12 kW. The stated hydronic relationship multiplies flow by the temperature difference and the water heat-capacity constant. The other choices fail because they omit flow, use half the transfer, or multiply only the constant and temperature difference. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

111. D — The correct answer is It absorbs water-volume changes as the system temperature changes. A diaphragm or bladder expansion tank limits pressure swings caused by thermal expansion. The other choices fail because they confuse hydronic expansion with combustion, fuel, or relief protection. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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117. B — The correct answer is Flushing removes construction debris and residue that could damage equipment. Controlled flushing protects downstream components and establishes a cleaner commissioning condition. The other choices fail because they confuse cleaning with pressure rating, testing, or material compatibility. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

118. A — The correct answer is The internal design may perform correctly only when installed in the intended direction. Directional components depend on correct orientation for control, check action, or measurement. The other choices fail because they treat the marking as identification, support, or water-quality certification. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

119. D — The correct answer is Flushing removes construction debris and residue that could damage equipment. Controlled flushing protects downstream components and establishes a cleaner commissioning condition. The other choices fail because they confuse cleaning with pressure rating,

testing, or material compatibility. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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122. D — The correct answer is 6.20 L. The required stock volume is the final volume multiplied by the stated fraction, with units retained in litres. The other choices fail because they use the remaining fraction, divide by the fraction, or add unlike quantities. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

123. C — The correct answer is Flushing removes construction debris and residue that could damage equipment. Controlled flushing protects downstream components and establishes a cleaner commissioning condition. The other choices fail because they confuse cleaning with pressure rating, testing, or material compatibility. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

124. B — The correct answer is The internal design may perform correctly only when installed in the intended direction. Directional components depend on correct orientation for control, check action, or measurement. The other choices fail because they treat the marking as identification, support, or water-quality certification. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

125. A — The correct answer is Flushing removes construction debris and residue that could damage equipment. Controlled flushing protects downstream components and establishes a cleaner commissioning condition. The other choices fail because they confuse cleaning with pressure rating, testing, or material compatibility. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.