PRACTICE EXAM 18: 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 18] A fitting is repeatedly installed out of alignment. What is the best first improvement?

A. Review the layout, mark reference points, and verify alignment before joining
B. Apply more sealant to force the fitting into position
C. Hide the mismatch with additional insulation
D. Tighten every connection beyond the manufacturer's limit

2. [Simulation 18] When a drawing and field conditions disagree, what is the most professional response?

A. Pause the affected work and obtain clarification before changing the design
B. Follow the drawing without checking the installation
C. Change the route silently to save time
D. Ask a helper to choose the preferred interpretation

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5. [Simulation 18] Before opening a pressurized water line, which action best controls the immediate hazard?

A. Open the nearest fixture and begin cutting immediately
B. Isolate the line, lock out the source, and verify zero pressure
C. Remove only the visible insulation
D. Increase system pressure to locate the release point

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11. [Simulation 18] A 5.3 m metal run changes temperature by 40°C. If expansion is 0.05 mm per metre per °C, what is the calculated expansion?

A. 12.60 mm
B. 5.30 mm
C. 10.60 mm
D. 15.60 mm

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15. [Simulation 18] When making a threaded joint, which approach best limits the chance of a leak?

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

16. [Simulation 18] 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

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19. [Simulation 18] 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

20. [Simulation 18] 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
D. Material compatibility, surface preparation, and the cement's working time

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D. Whether the pipe can be heated until it softens

23. [Simulation 18] A pipe assembly requires 3.30 m between reference points. One fitting has a 0.06 m takeoff. What cut length is required before joining?

A. 3.24 m
B. 3.30 m
C. 3.36 m
D. 3.18 m

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A. Cross-thread the fitting and compensate with extra tape
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25. [Simulation 18] 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

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28. [Simulation 18] What is the best reason to provide access at a drainage cleanout?

A. It gives maintenance equipment a controlled entry point for clearing the line
B. It increases the fixture's water temperature
C. It permanently replaces the building vent

D. It prevents all root intrusion without maintenance

29. [Simulation 18] What does aeration generally support in a biological wastewater process?

A. It removes every dissolved mineral by filtration
B. It creates a trap seal in the building drain
C. It prevents the need for sludge management
D. It supplies oxygen that helps microorganisms break down biodegradable matter

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32. [Simulation 18] What is the most useful first check when a fixture drains slowly?

A. Check for a local obstruction while considering the trap and nearby branch
B. Increase water pressure at the main
C. Remove the building vent cap permanently
D. Add sealant to the fixture outlet

33. [Simulation 18] What is the primary purpose of a trap seal in a drainage system?

A. It increases the water-supply pressure
B. It filters all suspended solids from sewage
C. It prevents every possible drain blockage
D. It blocks sewer gases while permitting fixture drainage

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48. [Simulation 18] Approximately how much water is held in a 4.8 m pipe with a 0.05 m internal diameter? Use $\pi = 3.1416$ and express the result in litres.

A. 9.42 L
B. 18.84 L
C. 4.71 L
D. 12.42 L

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60. [Simulation 18] What is the primary function of a pressure-reducing valve?

A. It increases flow by removing all restrictions
B. It prevents hot water from expanding
C. It disinfects the service line
D. It lowers excessive upstream pressure to a controlled downstream range

61. [Simulation 18] What is the purpose of a water-hammer arrestor?

A. It cushions pressure transients caused by rapid valve closure
B. It continuously filters the building water
C. It raises static pressure at fixtures
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64. [Simulation 18] What is the purpose of a backflow prevention device on a potable-water connection?

A. It increases the domestic hot-water temperature
B. It limits reversal of flow that could contaminate the drinking-water supply
C. It removes every dissolved contaminant
D. It replaces a pressure-reducing valve in all systems

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74. [Simulation 18] A fixture discharges 30 L in 30 seconds. What is the average flow rate?

A. 0.50 L/s
B. 900.00 L/s
C. 1.25 L/s
D. 1.00 L/s

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84. [Simulation 18] What does an ion-exchange softener primarily remove from hard water?

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

85. [Simulation 18] What is the main treatment mechanism of ultraviolet disinfection?

A. It removes grit by settling
B. Ultraviolet energy damages microorganisms so they cannot reproduce effectively
C. It exchanges sodium for hardness ions
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88. [Simulation 18] 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 softens all incoming water
C. It raises the fixture's operating temperature
D. It prevents contaminated water from being siphoned back into the supply

89. [Simulation 18] Why is a carbon filter commonly used in point-of-use treatment?

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

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92. [Simulation 18] Why is a fixture shutoff valve installed at an individual connection?

A. It allows the fixture to be serviced without shutting down the whole building
B. It converts wastewater into potable water
C. It sets every branch pressure automatically
D. It replaces the fixture's trap

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101. [Simulation 18] What does a circulator do in a hydronic heating system?

A. It removes all dissolved air by itself
B. It creates the pressure difference that moves water through the circuit
C. It stores the system's expansion volume
D. It measures the boiler's flue temperature

102. [Simulation 18] What is the role of a boiler temperature and pressure relief valve?

A. It maintains normal circulation during every outage
B. It filters scale from the return water
C. It opens when unsafe temperature or pressure conditions are reached
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105. [Simulation 18] What is the main purpose of an air separator in a hydronic heating loop?

A. It helps remove entrained air that can cause noise, corrosion, or poor circulation
B. It adds oxygen to accelerate corrosion
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D. It sets the boiler firing rate

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110. [Simulation 18] Using Q = 4.19 × flow × temperature difference, what heat transfer corresponds to 0.58 L/s and a 20°C temperature difference?

A. 24.30 kW
B. 58.60 kW
C. 83.80 kW

D. 48.60 kW

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112. [Simulation 18] What is the main purpose of an air separator in a hydronic heating loop?

A. It helps remove entrained air that can cause noise, corrosion, or poor circulation
B. It adds oxygen to accelerate corrosion
C. It replaces the expansion tank
D. It sets the boiler firing rate

113. [Simulation 18] What does a circulator do in a hydronic heating system?

A. It removes all dissolved air by itself
B. It stores the system's expansion volume
C. It creates the pressure difference that moves water through the circuit
D. It measures the boiler's flue temperature

114. [Simulation 18] What is the role of a boiler temperature and pressure relief valve?

A. It opens when unsafe temperature or pressure conditions are reached
B. It maintains normal circulation during every outage
C. It filters scale from the return water
D. It replaces the expansion tank during normal operation

115. [Simulation 18] What does a circulator do in a hydronic heating system?

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A. It maintains normal circulation during every outage
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117. [Simulation 18] What is the best reason to install gauges at selected process-piping locations?

A. They prevent every pressure surge automatically
B. They provide operating information for commissioning, control, and troubleshooting
C. They replace all isolation valves
D. They certify fluid purity without testing

118. [Simulation 18] Before connecting process piping to equipment, what should be verified first?

A. The material, pressure rating, connection type, and service-fluid compatibility
B. Only the pipe's exterior color
C. That the pipe is the longest available size
D. That all process valves are permanently locked open

119. [Simulation 18] What is the best reason to install gauges at selected process-piping locations?

A. They prevent every pressure surge automatically
B. They provide operating information for commissioning, control, and troubleshooting
C. They replace all isolation valves
D. They certify fluid purity without testing

120. [Simulation 18] Before connecting process piping to equipment, what should be verified first?

A. Only the pipe's exterior color
B. That the pipe is the longest available size
C. The material, pressure rating, connection type, and service-fluid compatibility
D. That all process valves are permanently locked open

121. [Simulation 18] What is the best reason to install gauges at selected process-piping locations?

A. They prevent every pressure surge automatically
B. They replace all isolation valves
C. They certify fluid purity without testing
D. They provide operating information for commissioning, control, and troubleshooting

122. [Simulation 18] A process solution is prepared from 28 L of stock material at 20% of the final volume. What stock volume is needed?

A. 22.40 L
B. 140.00 L
C. 5.60 L
D. 28.20 L

123. [Simulation 18] What is the best reason to install gauges at selected process-piping locations?

A. They prevent every pressure surge automatically
B. They replace all isolation valves

C. They certify fluid purity without testing
D. They provide operating information for commissioning, control, and troubleshooting

124. [Simulation 18] Before connecting process piping to equipment, what should be verified first?

A. Only the pipe's exterior color
B. The material, pressure rating, connection type, and service-fluid compatibility
C. That the pipe is the longest available size
D. That all process valves are permanently locked open

125. [Simulation 18] What is the best reason to install gauges at selected process-piping locations?

A. They provide operating information for commissioning, control, and troubleshooting
B. They prevent every pressure surge automatically
C. They replace all isolation valves
D. They certify fluid purity without testing

Practice Exam 18: Answer Key and Explanations

1. A — The correct answer is Review the layout, mark reference points, and verify alignment before joining. Reference marks and a layout check correct the process before a permanent joint is made. The other choices fail because they conceal the defect or risk damaging the joint. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

2. A — The correct answer is Pause the affected work and obtain clarification before changing the design. Clarification protects design intent, coordination, and the record of the work. The other choices fail because they allow an undocumented or potentially unsafe design change. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

3. D — The correct answer is Review the layout, mark reference points, and verify alignment before joining. Reference marks and a layout check correct the process before a permanent joint is made. The other choices fail because they conceal the defect or risk damaging the joint. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

4. C — The correct answer is Pause the affected work and obtain clarification before changing the design. Clarification protects design intent, coordination, and the record of the work. The other choices fail because they allow an undocumented or potentially unsafe design change. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

5. B — The correct answer is Isolate the line, lock out the source, and verify zero pressure. Isolation and verification remove stored energy before the line is disturbed. The other choices fail because they leave stored pressure or introduce a new hazard. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

6. C — The correct answer is Review the layout, mark reference points, and verify alignment before joining. Reference marks and a layout check correct the process before a permanent joint is made. The other choices fail because they conceal the defect or risk damaging the joint. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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8. D — The correct answer is Review the layout, mark reference points, and verify alignment before joining. Reference marks and a layout check correct the process before a permanent joint is made. The other choices fail because they conceal the defect or risk damaging the joint. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

9. A — The correct answer is Pause the affected work and obtain clarification before changing the design. Clarification protects design intent, coordination, and the record of the work. The other choices fail because they allow an undocumented or potentially unsafe design change. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

10. B — The correct answer is Isolate the line, lock out the source, and verify zero pressure. Isolation and verification remove stored energy before the line is disturbed. The other choices fail because they leave stored pressure or introduce a new hazard. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

11. C — The correct answer is 10.60 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. A — The correct answer is Isolate the line, lock out the source, and verify zero pressure. Isolation and verification remove stored energy before the line is disturbed. The other choices fail because they leave stored pressure or introduce a new hazard. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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14. A — The correct answer is Pause the affected work and obtain clarification before changing the design. Clarification protects design intent, coordination, and the record of the work. The other choices fail because they allow an undocumented or potentially unsafe design change. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

15. D — 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.

16. 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.

17. C — 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.

18. A — 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.

19. 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.

20. 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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choices fail because they describe cooling, threading, or skipping controlled heating. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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23. A — The correct answer is 3.24 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. B — 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.

25. 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.

26. B — 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.

27. C — 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.

28. A — The correct answer is It gives maintenance equipment a controlled entry point for clearing the line. A cleanout allows inspection and clearing without dismantling finished piping. The other choices fail because they confuse maintenance access with heating, venting, or guaranteed root control. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

29. D — The correct answer is It supplies oxygen that helps microorganisms break down biodegradable matter. Aeration supports the microbial activity used in secondary biological treatment. The other choices fail because they confuse aeration with mineral removal, plumbing traps, or solids management. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

30. C — The correct answer is It gives maintenance equipment a controlled entry point for clearing the line. A cleanout allows inspection and clearing without dismantling finished piping. The other choices fail because they confuse maintenance access with heating, venting, or guaranteed root control. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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32. A — The correct answer is Check for a local obstruction while considering the trap and nearby branch. A localized blockage is common and can be investigated without damaging the system. The other choices fail because they apply unrelated pressure changes or create a new defect. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

33. D — The correct answer is It blocks sewer gases while permitting fixture drainage. The retained water in a trap forms a gas barrier without stopping normal drainage. The other choices fail because they confuse the trap with a pressure device, treatment unit, or universal blockage cure. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

34. B — The correct answer is Check for a local obstruction while considering the trap and nearby branch. A localized blockage is common and can be investigated without damaging the system. The other choices fail because they apply unrelated pressure changes or create a new defect. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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48. A — The correct answer is 9.42 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 It blocks sewer gases while permitting fixture drainage. The retained water in a trap forms a gas barrier without stopping normal drainage. The other choices fail because they confuse the trap with a pressure device, treatment unit, or universal blockage cure. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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60. D — The correct answer is It lowers excessive upstream pressure to a controlled downstream range. A pressure-reducing valve manages downstream pressure when supply pressure is higher than the system requires. The other choices fail because they describe flow creation, thermal expansion control, or disinfection. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

61. A — The correct answer is It cushions pressure transients caused by rapid valve closure. A compressible chamber absorbs part of the transient energy and reduces shock noise and stress. The other choices fail because they give the arrestor a filtration, pressure-boosting, or support function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

62. A — The correct answer is It lowers excessive upstream pressure to a controlled downstream range. A pressure-reducing valve manages downstream pressure when supply pressure is higher than the system requires. The other choices fail because they describe flow creation, thermal expansion control, or disinfection. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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64. B — The correct answer is It limits reversal of flow that could contaminate the drinking-water supply. Backflow protection addresses the direction of flow and the risk of cross-connection contamination. The other choices fail because they confuse backflow control with heating, treatment, or universal pressure reduction. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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system requires. The other choices fail because they describe flow creation, thermal expansion control, or disinfection. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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71. C — The correct answer is It limits reversal of flow that could contaminate the drinking-water supply. Backflow protection addresses the direction of flow and the risk of cross-connection contamination. The other choices fail because they confuse backflow control with heating, treatment, or universal pressure reduction. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

72. B — The correct answer is It lowers excessive upstream pressure to a controlled downstream range. A pressure-reducing valve manages downstream pressure when supply pressure is higher than the system requires. The other choices fail because they describe flow creation, thermal expansion control, or disinfection. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

73. A — The correct answer is It cushions pressure transients caused by rapid valve closure. A compressible chamber absorbs part of the transient energy and reduces shock noise and stress. The other choices fail because they give the arrestor a filtration, pressure-boosting, or support function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

74. D — The correct answer is 1.00 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. B — The correct answer is It cushions pressure transients caused by rapid valve closure. A compressible chamber absorbs part of the transient energy and reduces shock noise and stress. The other choices fail because they give the arrestor a filtration, pressure-boosting, or support function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

76. C — The correct answer is It limits reversal of flow that could contaminate the drinking-water supply. Backflow protection addresses the direction of flow and the risk of cross-connection contamination. The other choices fail because they confuse backflow control with heating, treatment, or universal pressure reduction. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

77. A — The correct answer is It lowers excessive upstream pressure to a controlled downstream range. A pressure-reducing valve manages downstream pressure when supply pressure is higher than the system requires. The other choices fail because they describe flow creation, thermal expansion control, or disinfection. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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79. D — The correct answer is It lowers excessive upstream pressure to a controlled downstream range. A pressure-reducing valve manages downstream pressure when supply pressure is higher than the system requires. The other choices fail because they describe flow creation, thermal expansion control, or disinfection. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

80. C — The correct answer is It cushions pressure transients caused by rapid valve closure. A compressible chamber absorbs part of the transient energy and reduces shock noise and stress. The other choices fail because they give the arrestor a filtration, pressure-boosting, or support function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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82. C — The correct answer is It cushions pressure transients caused by rapid valve closure. A compressible chamber absorbs part of the transient energy and reduces shock noise and stress. The other choices fail because they give the arrestor a filtration, pressure-boosting, or support function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

83. D — The correct answer is It limits reversal of flow that could contaminate the drinking-water supply. Backflow protection addresses the direction of flow and the risk of cross-connection contamination. The other choices fail because they confuse backflow control with heating, treatment, or universal pressure reduction. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

84. A — 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.

85. B — 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.

86. B — 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.

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88. D — 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.

89. A — 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.

90. D — 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.

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92. A — 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.

93. 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.

94. D — 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.

95. 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.

96. B — 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.

97. 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.

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100. 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.

101. B — The correct answer is It creates the pressure difference that moves water through the circuit. The circulator provides flow through the designed circuit; other components handle air, expansion, and measurement. The other choices fail because they assign the pump functions belonging to separate components. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

102. C — The correct answer is It opens when unsafe temperature or pressure conditions are reached. The relief valve is a safety device that protects the vessel from excessive conditions. The other choices fail because they give a safety valve a circulation, filtration, or normal expansion function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

103. B — The correct answer is It creates the pressure difference that moves water through the circuit. The circulator provides flow through the designed circuit; other components handle air, expansion, and measurement. The other choices fail because they assign the pump functions belonging to separate components. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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105. A — The correct answer is It helps remove entrained air that can cause noise, corrosion, or poor circulation. Removing air improves circulation and protects components from air-related operating problems. The other choices fail because they add air, substitute for expansion control, or change combustion. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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109. D — The correct answer is It opens when unsafe temperature or pressure conditions are reached. The relief valve is a safety device that protects the vessel from excessive conditions. The other choices fail because they give a safety valve a circulation, filtration, or normal expansion function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

110. D — The correct answer is 48.60 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. B — The correct answer is It opens when unsafe temperature or pressure conditions are reached. The relief valve is a safety device that protects the vessel from excessive conditions. The other choices fail because they give a safety valve a circulation, filtration, or normal expansion function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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114. A — The correct answer is It opens when unsafe temperature or pressure conditions are reached. The relief valve is a safety device that protects the vessel from excessive conditions. The other choices fail because they give a safety valve a circulation, filtration, or normal expansion function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

115. D — The correct answer is It creates the pressure difference that moves water through the circuit. The circulator provides flow through the designed circuit; other components handle air, expansion, and measurement. The other choices fail because they assign the pump functions belonging to separate components. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

116. C — The correct answer is It opens when unsafe temperature or pressure conditions are reached. The relief valve is a safety device that protects the vessel from excessive conditions. The other choices fail because they give a safety valve a circulation, filtration, or normal expansion function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

117. B — The correct answer is They provide operating information for commissioning, control, and troubleshooting. Gauges make system conditions visible so abnormal pressure or flow can be investigated. The other choices fail because they assign gauges a protective, isolation, or laboratory-certification function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

118. A — The correct answer is The material, pressure rating, connection type, and service-fluid compatibility. Process service requires compatibility and rating checks because the fluid and operating conditions may differ from ordinary plumbing. The other choices fail because they ignore service conditions or prescribe unsafe operating positions. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

119. B — The correct answer is They provide operating information for commissioning, control, and troubleshooting. Gauges make system conditions visible so abnormal pressure or flow can be investigated. The other choices fail because they assign gauges a protective, isolation, or laboratory-certification function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

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122. C — The correct answer is 5.60 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. D — The correct answer is They provide operating information for commissioning, control, and troubleshooting. Gauges make system conditions visible so abnormal pressure or flow can be investigated. The other choices fail because they assign gauges a protective, isolation, or laboratory-certification function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

124. B — The correct answer is The material, pressure rating, connection type, and service-fluid compatibility. Process service requires compatibility and rating checks because the fluid and operating conditions may differ from ordinary plumbing. The other choices fail because they ignore service conditions or prescribe unsafe operating positions. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.

125. A — The correct answer is They provide operating information for commissioning, control, and troubleshooting. Gauges make system conditions visible so abnormal pressure or flow can be investigated. The other choices fail because they assign gauges a protective, isolation, or laboratory-certification function. Confirm the drawings and code before work. This supports safe, reliable, serviceable installation.