PRACTICE EXAM 23: OREGON CCB SIMULATION (80 QUESTIONS)

80 Multiple-Choice Questions | 200 Minutes | Open-Book Format

1. A contractor is preparing a bid for a residential project and the homeowner provides architectural plans without structural engineering. The plans show a large open-concept living area requiring the removal of two interior bearing walls. Under Oregon law, who is responsible for providing the structural engineering design for the replacement beams and headers?

A. The contractor is responsible for the structural design because the contractor's CCB license includes engineering authority for residential projects
B. The homeowner or their architect is responsible for providing the structural engineering, though the contractor should inform the homeowner that licensed structural engineering is required before the bearing walls can be removed
C. The building department provides the structural engineering as part of the plan review process when the building permit is submitted
D. No structural engineering is required for residential interior bearing wall removal as long as the contractor uses standard span tables from the building code

2. A contractor operates a construction business in Oregon and wants to establish a safety incentive program to reduce workplace injuries. Under OSHA guidelines, which type of safety incentive program is most likely to comply with federal regulations?

A. A program that rewards employees with cash bonuses each month that no injuries are reported on the construction jobsite
B. A program that rewards employees for participating in safety activities such as hazard identification, near-miss reporting, safety training completion, and safety committee participation
C. A program that deducts money from employee paychecks when safety violations are observed by the site superintendent
D. A program that terminates any employee who reports an injury because it demonstrates personal carelessness on the project

3. A contractor is building a residential home and the building inspector identifies that the attic access opening does not meet the minimum size required by the building code. Under the Oregon Residential Specialty Code, what is the minimum size requirement for an attic access opening when the attic has at least thirty inches of vertical clearance above the insulation?

A. Eighteen inches by eighteen inches is the minimum size for residential attic access openings under all building code editions
B. Thirty inches by thirty inches is the minimum for all attic spaces regardless of the vertical clearance available above insulation
C. Twenty-two inches by thirty inches is the generally required minimum size for attic access openings in most residential code editions
D. Twelve inches by twenty-four inches is the minimum because attic access is needed only for visual inspection purposes

4. A contractor is managing a commercial project and the owner's architect issues a field order directing the contractor to adjust the location of a mechanical room door by eighteen inches to accommodate a revised equipment layout. The field order does not include any cost or time adjustment. Under standard AIA contract terms, what is the distinction between a field order and a change order?

A. A field order and a change order are identical documents and may be used interchangeably on all commercial construction projects
B. A field order increases the contract price while a change order decreases the contract price for minor scope reductions
C. A field order typically addresses minor adjustments that do not change the contract price or time, while a change order formally modifies the contract price, time, or both
D. A field order is issued by the contractor while a change order is issued exclusively by the owner's architect during construction

5. A contractor is hired to install a residential standby generator system. The installation includes a two-hundred-gallon propane tank located adjacent to the house. Under Oregon fire codes, what is the minimum setback distance from the propane tank to the building?

A. No minimum setback is required because residential propane tanks are exempt from setback regulations in Oregon fire codes
B. The minimum setback distance is determined by the tank size and the applicable fire code, and for a two-hundred-gallon tank, the setback is typically ten feet from the building or as specified by the authority having jurisdiction
C. The minimum setback is twenty-five feet from any building regardless of the propane tank size or the applicable code edition
D. The minimum setback is three feet from the building for residential tanks under five hundred gallons in above-ground installations

6. Under Oregon employment law, an employer must provide employees with a written statement of the terms and conditions of employment at the time of hire. A contractor hires a new carpenter and provides only a verbal explanation of the pay rate and work schedule. What legal risk does this create?

A. The contractor may face penalties from the Bureau of Labor and Industries for failing to provide the required written notice of employment terms including pay rate, pay schedule, and other mandatory information at the time of hire
B. No legal risk exists because verbal communication of employment terms is sufficient for construction industry workers in Oregon
C. The risk is limited to the first ninety days of employment because after the probationary period the verbal terms become binding
D. The contractor must provide written terms only for salaried employees and hourly construction workers are exempt from the requirement

7. A contractor is building a commercial structure and the specifications require all exterior hollow metal doors and frames to be galvanized steel with a factory-applied primer. The contractor installs standard non-galvanized hollow metal doors and frames at several exterior openings. What will happen to these non-galvanized units over time?

A. Non-galvanized steel performs identically to galvanized steel when a field-applied primer coat is applied within thirty days
B. Non-galvanized hollow metal doors and frames exposed to exterior weather conditions will corrode and rust prematurely because they lack the zinc protective coating that galvanizing provides
C. Non-galvanized steel is preferred for exterior applications because the zinc coating on galvanized steel prevents paint adhesion
D. The standard factory primer on non-galvanized units provides equivalent corrosion protection to galvanizing for exterior exposures

8. A contractor is performing a commercial renovation and the building's existing fire sprinkler system uses standard response sprinkler heads throughout. The renovation converts a storage room into a server room. The fire protection engineer specifies clean agent suppression for the server room instead of the existing water-based sprinkler system. Why is the clean agent system preferred for this application?

A. Clean agent systems suppress fire without water damage to electronic equipment and leave no residue, making them ideal for protecting sensitive electronics that would be destroyed by water discharge

B. Clean agent systems are less expensive to install than modifying the existing sprinkler system for the new server room layout
C. Standard sprinkler heads cannot detect fires in server rooms because the ceiling temperatures remain too cool for thermal activation
D. Clean agent systems are required by the NEC for all rooms containing electrical equipment exceeding two hundred forty volts

9. A contractor is estimating a residential project and needs to calculate the number of sheets of plywood needed for roof sheathing. The roof has two rectangular planes, each measuring forty feet long by sixteen feet from eave to ridge. Each sheet of plywood is four feet by eight feet. Allowing for a five percent waste factor, how many sheets should the contractor order?

A. Thirty-two sheets based on one roof plane divided by the sheet area without the waste factor for cutting and fitting waste
B. Sixty sheets based on the total roof area divided by the sheet area without the waste factor for cutting and fitting losses
C. Eighty sheets based on the total area plus a twenty-five percent waste factor for the hip roof configuration and valley cuts
D. Forty-two sheets based on the total roof area of one thousand two hundred eighty square feet divided by thirty-two square feet per sheet plus the five percent waste factor

10. A contractor is managing a commercial project and the building inspector discovers that the fire-rated corridor walls do not extend above the ceiling to the underside of the floor or roof deck above. The fire-rated walls stop at the ceiling grid. Under the building code, why must fire-rated walls extend to the deck above?

A. Fire-rated walls are only required to extend to the ceiling line because the ceiling tile grid provides the fire separation above
B. The extension above the ceiling is an aesthetic requirement that creates a finished appearance in the plenum space above the corridor
C. Fire-rated walls must extend to the deck only when the corridor serves as a smoke compartment boundary in hospital occupancies
D. Fire and smoke can travel through the open plenum space above the ceiling, bypassing the fire-rated wall if it does not extend to the deck above, defeating the purpose of the fire-rated barrier

11. A contractor is building a residential addition and the structural engineer specifies a post-and-beam system with glulam beams. The contractor orders the beams and they arrive at the jobsite wrapped in plastic. The contractor stores the beams in the yard for three weeks before

installation without any cover or protection from weather. What is the primary concern with this storage method?

A. Glulam beams exposed to rain and sun without protective covering can absorb moisture, swell, delaminate, warp, or develop surface checking that compromises their structural integrity and appearance
B. Glulam beams are impervious to weather exposure and require no protective covering during jobsite storage periods
C. The three-week exposure period is too short to cause any damage because glulam beams require six months of exposure before degradation
D. The plastic wrapping provides permanent weather protection and does not need to be supplemented with additional covering

12. Under Oregon construction lien law, a contractor files a construction lien against a residential property for unpaid work. The homeowner wants to sell the property but the lien clouds the title. What can the homeowner do to clear the title while the lien dispute is being resolved?

A. The homeowner can ignore the lien because construction liens automatically expire after six months without any action required
B. The homeowner can file a complaint with the CCB which automatically removes the lien from the property's title record
C. The homeowner can refinance the mortgage which automatically subordinates the construction lien below the new loan position
D. The homeowner can deposit a surety bond or cash deposit with the court to release the lien from the property while the dispute is resolved through the legal process

13. A contractor is performing a commercial building envelope assessment and discovers that the exterior brick veneer has a pattern of horizontal cracking at regular intervals corresponding to the floor line locations. What is the most likely cause of this cracking pattern?

A. The mortar mix used in the brick veneer was too strong and created rigid bonds that cracked from normal building vibration
B. The brick veneer lacks properly positioned shelf angles or expansion joints at the floor lines, causing the accumulated weight of the masonry above to exceed the veneer's tensile capacity at each floor level
C. The foundation has settled unevenly on alternating sides of the building causing the floor lines to shift and crack the veneer
D. The brick manufacturer supplied defective bricks with internal stress fractures that align horizontally due to the manufacturing process

14. A contractor is managing a residential project and the homeowner asks the contractor to explain the difference between a fixed-price contract and a cost-plus contract. Which statement accurately describes the fundamental risk allocation difference between these two contract types?

A. Both contract types place equal financial risk on the contractor and the homeowner regardless of the terms in the agreement
B. A cost-plus contract places all financial risk on the contractor because the contractor guarantees the total project cost will not exceed a specified amount
C. A fixed-price contract places all risk on the homeowner because the homeowner must pay whatever the project ultimately costs
D. A fixed-price contract places the cost risk on the contractor who must complete the work for the agreed price regardless of actual costs, while a cost-plus contract places the cost risk on the homeowner who pays actual costs plus the contractor's fee

15. A contractor is installing a residential heating system and the mechanical plans specify a high-efficiency condensing gas furnace with a ninety-six percent AFUE rating. The contractor installs an eighty percent AFUE standard efficiency furnace instead. What are the two primary consequences of this substitution?

A. The eighty-percent furnace produces more heat output than the ninety-six-percent unit and the substitution improves the system performance
B. The substitution affects only the furnace warranty and has no impact on energy consumption or the building department inspection
C. The installation fails the mechanical inspection because the furnace does not meet the energy code's minimum efficiency requirement, and the homeowner will pay significantly higher heating costs due to the lower efficiency
D. The eighty-percent furnace requires a different vent type but otherwise performs identically to the specified high-efficiency unit

16. A contractor is building a commercial structure and the structural engineer requires the contractor to perform cylinder break tests on the concrete at seven days and twenty-eight days after placement. The seven-day break results show the concrete has achieved only forty percent of the specified twenty-eight-day strength. Is this result cause for concern?

A. The seven-day result is acceptable because concrete typically reaches forty to fifty percent of its design strength at seven days
B. The seven-day result indicates the concrete will exceed the specified twenty-eight-day strength by a significant margin
C. Seven-day cylinder breaks have no predictive value and should never be used for quality control decisions during construction

D. The seven-day result of forty percent is below the typical sixty-five to seventy-five percent range, suggesting a potential problem with the concrete mix that warrants investigation and close monitoring of the twenty-eight-day results

17. Under Oregon law, a contractor renovates a residential bathroom and installs a new shower with a glass shower door. The building code requires the glass in shower enclosures to be safety glazing. The contractor installs standard annealed glass in the shower door. What hazard does this create?

A. Standard annealed glass breaks into large, sharp shards that can cause severe lacerations when shattered by impact, which is why the code requires tempered or laminated safety glazing in shower enclosures and other hazardous locations
B. Standard annealed glass provides identical safety performance to tempered glass in all shower door applications
C. The glass type affects only the shower door's thermal performance and has no impact on occupant safety during use
D. Standard annealed glass is acceptable in shower doors if the contractor applies a safety film to the interior surface

18. A contractor is managing a commercial project and the specifications require the contractor to obtain LEED certification for the building. The LEED rating system awards credits across several categories. Which category addresses the building's water efficiency measures such as low-flow fixtures, rainwater harvesting, and efficient irrigation?

A. The Water Efficiency category specifically evaluates the building's strategies for reducing potable water consumption through low-flow fixtures, efficient irrigation, rainwater harvesting, and graywater reuse systems
B. The Energy and Atmosphere category evaluates water efficiency because water heating represents a significant portion of energy use
C. The Materials and Resources category evaluates water efficiency because water is classified as a construction material resource
D. The Indoor Environmental Quality category evaluates water efficiency because water quality affects occupant health and comfort

19. A contractor is building a residential deck and the building code requires the ledger board to be fastened to the house with lag screws or through-bolts. The contractor uses lag screws but does not install the required flashing above the ledger board to prevent water intrusion. What is the long-term consequence of this omission?

A. The missing flashing has no impact because the lag screw heads create a watertight seal at each penetration through the siding
B. Water infiltrates behind the ledger board and between the ledger and the house framing, causing wood rot, mold growth, and eventual deterioration of the connection that could lead to deck collapse
C. The missing flashing affects only the siding appearance and does not compromise the structural integrity of the ledger connection
D. Water intrusion at the ledger board is prevented by the natural drainage gap between the ledger and the house sheathing

20. A contractor is reviewing a commercial project's geotechnical report and finds that the soils engineer recommends a specific compaction density for the structural fill beneath the building pad. The specification requires ninety-five percent of maximum dry density per the modified Proctor test. What does this compaction requirement ensure?

A. The compacted fill provides only a smooth surface for the construction equipment to operate on during the building phase
B. The compacted fill achieves adequate density and bearing capacity to support the building loads without excessive settlement
C. The compaction percentage determines the fill material's moisture content rather than its structural density or bearing capacity
D. The ninety-five percent requirement applies only to the top six inches of fill and the deeper fill layers do not require compaction

21. A contractor is hired to install a commercial building's stormwater management system. The plans show a bioretention basin designed to filter and infiltrate stormwater runoff from the parking lot. During installation, the contractor discovers that the native soil is heavy clay with very low permeability. The bioretention basin as designed relies on infiltration into the native soil. What should the contractor do?

A. Install the bioretention basin as designed because clay soils eventually absorb water if given sufficient time to percolate
B. Replace the clay soil with sandy loam to a depth of twelve feet to achieve the required infiltration rate for the basin design
C. Add a gravel drainage layer at the bottom of the basin without notifying the engineer because gravel improves all soil drainage
D. Notify the civil engineer that the native soil conditions do not support the designed infiltration rate and request a revised design that may include an underdrain system to manage the water that cannot infiltrate

22. Under Oregon law, a contractor is hired to build a residential garage with a living space above. The building code requires a one-hour fire-rated floor-ceiling assembly between the garage and the living space. The contractor installs a standard non-rated floor assembly. During the framing inspection, the building inspector rejects the installation. What must the contractor do?

A. Install the required fire-rated floor-ceiling assembly using materials and methods that achieve the specified one-hour fire-resistance rating before the inspection can be approved
B. Apply fire-retardant paint to the underside of the standard floor sheathing to achieve the equivalent of a one-hour fire rating
C. Install a residential fire sprinkler system in the garage to compensate for the non-rated floor assembly between the spaces
D. Request a variance from the building department because the garage ceiling height exceeds eight feet, which eliminates the need for fire separation

23. A contractor is managing a commercial project and discovers that the subcontractor's workers are not wearing the required high-visibility safety vests in an active traffic area of the construction site. Under OSHA regulations, whose responsibility is it to ensure subcontractor workers wear the required personal protective equipment?

A. The subcontractor's workers are individually responsible for their own PPE and neither the subcontractor nor the general contractor has any enforcement obligation
B. The building owner is responsible for all PPE requirements because the owner controls the property where the work is performed
C. The subcontractor is responsible for their own employees' PPE compliance but the general contractor has no authority over the subcontractor's safety practices
D. The subcontractor is primarily responsible for their employees' PPE, but the general contractor also has a duty to ensure safe conditions across the entire site and may need to address observed hazards

24. A contractor is building a residential home and the plans specify a whole-house surge protection device installed at the main electrical panel. What is the primary purpose of whole-house surge protection?

A. To protect the home's electrical system and connected appliances from voltage spikes caused by lightning strikes, utility switching, and other transient overvoltage events that can damage sensitive electronic equipment
B. To increase the available amperage at the main panel by regulating the incoming voltage to a consistent one hundred twenty volts
C. To eliminate the need for individual surge protector power strips at each electronic device throughout the home's interior spaces

D. To reduce the homeowner's monthly electric bill by filtering voltage irregularities that cause inefficient energy consumption

25. A contractor is performing a commercial renovation and the architect specifies a particular acoustic ceiling tile with a specific Noise Reduction Coefficient rating of zero-point-eight-five. The contractor installs ceiling tiles with an NRC rating of zero-point-five-five. What is the consequence of this substitution?

A. The lower-rated tiles provide better sound quality because they reflect more sound energy back into the occupied space below
B. The NRC rating affects only the ceiling tile's fire resistance and has no impact on the room's acoustical performance
C. The room will have noticeably poorer sound absorption, resulting in increased reverberation, echo, and background noise that may fail to meet the project's acoustical performance requirements
D. The substitution is acceptable because NRC ratings vary by less than ten percent between different ceiling tile products

26. A contractor is building a residential addition and the foundation plan shows dowels connecting the new foundation to the existing foundation. The dowels are installed by drilling into the existing concrete and setting the rebar with structural adhesive. The building inspector requires the contractor to demonstrate that the adhesive anchor installation meets the manufacturer's requirements. What is the critical installation factor for adhesive anchors in concrete?

A. The adhesive must cure for a minimum of thirty days before any loads are applied to the anchor connection system
B. The drilled hole must be properly cleaned of dust and debris before the adhesive is injected, because contamination prevents the adhesive from bonding to the concrete and dramatically reduces the anchor's capacity
C. The adhesive anchor must be installed only during summer months because the adhesive requires ambient temperatures above seventy degrees to cure properly
D. The rebar dowel must be coated with a primer before insertion into the adhesive-filled hole to improve the bond strength

27. A contractor is managing a commercial project and the mechanical engineer requires the contractor to install test and balance ports on all major ductwork branches. What is the purpose of these test and balance ports?

A. To provide access points for injecting cleaning chemicals into the ductwork for periodic system maintenance and sanitization
B. To serve as emergency pressure relief openings that prevent ductwork failure during system startup and high-pressure events
C. To allow the testing and balancing technician to insert measurement instruments that measure airflow velocity and volume at each branch, enabling precise adjustment of the air distribution system to match the design specifications
D. To provide access for the building inspector to visually examine the interior of the ductwork during the mechanical inspection

28. A contractor is reviewing a residential project's plans and the structural engineer specifies a minimum embedment depth of seven inches for the anchor bolts in the foundation stem wall. The contractor sets the anchor bolts at only four inches of embedment. What is the structural consequence?

A. The four-inch embedment provides adequate capacity because anchor bolt capacity is determined solely by the bolt diameter
B. The four-inch embedment is acceptable if the contractor uses a higher-strength bolt grade to compensate for the reduced depth
C. The shallow embedment affects only the bolt's corrosion resistance and has no impact on the structural pullout capacity
D. The reduced embedment significantly decreases the anchor bolt's pullout resistance, potentially allowing the bolt to pull out of the concrete under wind uplift or seismic forces before reaching its design capacity

29. Under Oregon law, a contractor discovers that an employee has been working while under the influence of alcohol on a commercial construction site. What is the contractor's legal obligation regarding this situation?

A. The contractor must document the observation and allow the employee to continue working until the end of the current shift
B. The contractor must transfer the employee to a non-hazardous task such as material sorting until the employee sobers up
C. The contractor has no obligation because Oregon law does not address substance impairment in construction workplace settings
D. The contractor must remove the employee from the worksite immediately because an impaired worker poses a serious safety risk to themselves and others, and the contractor should follow the company's substance abuse policy and applicable law

30. A contractor is building a commercial parking structure and the specifications require the concrete deck to have a minimum slope of one-quarter inch per foot toward the floor drains for proper water drainage. The contractor pours the deck flat with no slope. What operational problem does this create?

A. The flat deck has no impact on parking garage operations because vehicles drive water off the deck surface through tire contact
B. The flat deck is acceptable if the contractor applies a waterproof membrane that eliminates the need for surface drainage entirely
C. Standing water on the flat deck accelerates deterioration of the concrete surface through freeze-thaw cycling, promotes chloride penetration from deicing salts, creates slip hazards for pedestrians, and may cause leaks to the level below
D. The flat deck affects only the visual appearance of the garage and has no functional impact on drainage or durability performance

31. A contractor is hired to install a commercial HVAC system in a multi-story office building. The mechanical plans show a variable air volume system with terminal units on each floor. The contractor installs constant volume terminal units instead of the specified variable air volume units. What is the primary consequence of this substitution?

A. Constant volume units cannot adjust airflow based on zone demands, resulting in energy waste from overcooling or overheating unoccupied zones, and the building will not meet the energy code requirements for demand-based ventilation
B. Constant volume units provide identical energy performance to variable air volume units in all commercial office applications
C. The substitution improves the building's energy efficiency because constant volume units maintain more consistent temperatures
D. Constant volume units are preferred for multi-story buildings because they simplify the building automation system programming

32. A contractor is building a residential home and the landscape architect specifies a retaining wall with a drainage system behind the wall. The drainage system includes a perforated pipe in a gravel bed along the base of the wall with a filter fabric wrapping. The contractor installs the pipe but does not wrap the gravel in filter fabric. What will happen over time?

A. The gravel provides permanent drainage without filter fabric because gravel is naturally resistant to soil contamination
B. Fine soil particles will migrate into the gravel bed and clog the perforated pipe, eventually causing the drainage system to fail and hydrostatic pressure to build up behind the wall
C. The filter fabric is only needed during construction to keep the gravel clean and serves no permanent function after backfilling

D. The pipe will continue to drain even without filter fabric because the perforations are too small for soil particles to enter

33. A contractor is managing a commercial project and the specifications require the contractor to provide a warranty for all work. The specifications state that the warranty period begins at the date of substantial completion. The project reaches substantial completion on March first, but the punch list is not completed until April fifteenth. When does the warranty period begin?

A. The warranty period begins on March first, the date of substantial completion, regardless of when the punch list work is finished
B. The warranty period begins on April fifteenth, when the punch list was completed and all remaining work was accepted
C. The warranty period begins on the date the certificate of occupancy was issued by the local building department
D. The warranty period begins thirty days after the contractor submits the final payment application to the project owner

34. Under Oregon law, a general contractor hires a subcontractor for the plumbing work on a residential project. The subcontractor's work is defective, resulting in water damage to the homeowner's property. The homeowner files a complaint with the CCB against the general contractor. Can the general contractor be held responsible for the subcontractor's defective work?

A. Yes, the general contractor is responsible to the homeowner for all work performed on the project, including work performed by subcontractors, and the CCB may hold the general contractor accountable for the subcontractor's defective work
B. No, the homeowner must file the complaint exclusively against the plumbing subcontractor who performed the defective work
C. Yes, but only if the general contractor failed to verify the subcontractor's CCB license before hiring them for the project
D. No, the general contractor's responsibility ends after verifying the subcontractor's insurance coverage at the start of the project

35. A contractor is installing a commercial fire alarm system and the specifications require the installation of duct smoke detectors in the HVAC supply and return air ductwork. What is the purpose of duct smoke detectors in an HVAC system?

A. To measure the air quality in the ductwork and alert the building automation system when carbon dioxide levels exceed limits

B. To detect humidity levels in the ductwork and activate the dehumidification system when moisture exceeds acceptable thresholds
C. To detect smoke in the HVAC ductwork and shut down the air handling equipment to prevent the distribution of smoke throughout the building via the mechanical ventilation system
D. To monitor the ductwork for grease buildup and alert the maintenance staff when the ducts require professional cleaning service

36. A contractor is building a residential home and the energy code requires the ductwork to be sealed with mastic or approved tape. The contractor uses standard cloth duct tape to seal all ductwork joints. The energy inspector rejects the installation. Why is standard cloth duct tape not acceptable?

A. Standard cloth duct tape is more expensive than mastic and the code requires the most cost-effective sealing method available
B. Standard cloth duct tape meets all energy code requirements and the inspector's rejection is an error in code interpretation
C. Standard cloth duct tape adhesive deteriorates over time from temperature cycling and airflow, causing joints to open and the duct system to leak conditioned air, which is why the energy code requires mastic or UL-listed duct tape
D. Standard cloth duct tape is acceptable for supply ducts but not for return air ducts because the tape fibers contaminate return air

37. A contractor is managing a commercial project and the owner requests a detailed cost breakdown for a change order valued at thirty-two thousand dollars. The breakdown must show the cost of labor, materials, equipment, subcontractor costs, and the contractor's overhead and profit. Under standard AIA contract terms, what markup is typically applied to the contractor's own work on a change order?

A. The markup percentage is fixed at twenty-five percent by the AIA standard contract regardless of the project specifics
B. The markup percentage for the contractor's own work is defined in the contract's general conditions, typically ranging from ten to fifteen percent for overhead and profit combined
C. No markup is allowed on change order work because the contractor already receives overhead and profit from the base contract
D. The markup percentage is negotiated after the change order work is completed based on the contractor's actual overhead costs

38. A contractor is building a residential addition and the plans require a continuous load path from the roof to the foundation. The structural engineer specifies hurricane straps at the rafter-to-wall connections, hold-down hardware at the wall-to-foundation connections, and anchor

bolts at the sill plate. The contractor installs only the anchor bolts and omits the hurricane straps and hold-down hardware. What structural deficiency does this create?

A. The anchor bolts alone provide adequate uplift resistance for residential structures in Oregon's wind and seismic conditions
B. The missing straps and hold-downs affect only the building's aesthetic appearance and do not compromise structural performance
C. The hurricane straps are optional components that improve the building's performance beyond the minimum code requirements
D. The continuous load path is broken because the forces that travel from the roof through the walls cannot be transferred to the foundation without the specified connectors at each level, leaving the structure vulnerable to wind uplift and seismic overturning

39. A contractor is reviewing the payment application process for a commercial project. The contract requires the contractor to submit pay applications on the twenty-fifth of each month. The architect has fourteen days to review and certify the application. The owner then has fifteen days to make payment after certification. If the contractor submits the application on November twenty-fifth and the architect certifies it on December fifth, when is the owner's payment due?

A. December fifth because payment is due immediately upon the architect's certification of the pay application
B. December twentieth because the owner has fifteen calendar days from certification to process and release payment
C. January ninth because the owner's payment period begins on the first business day of the month following certification
D. December twenty-fifth because the owner has thirty calendar days from the original submission date to make payment

40. A contractor is performing a commercial renovation and discovers that the existing building has a mechanical system using R-twenty-two refrigerant. The HVAC equipment is twenty years old and the owner wants to replace it with new equipment. Under current environmental regulations, what restriction applies to R-twenty-two refrigerant?

A. R-twenty-two may still be manufactured and used in new equipment without any restrictions under current federal regulations
B. R-twenty-two is banned from all use including servicing existing equipment and must be removed from all systems immediately
C. The production and import of R-twenty-two has been phased out under the Clean Air Act, and new equipment must use approved alternative refrigerants, though existing R-twenty-two may still be used to service existing systems
D. R-twenty-two restrictions apply only to commercial systems larger than five tons and residential systems remain exempt

41. A contractor is building a residential home and the plans show a beam bearing on a masonry column in the crawl space. The mason builds the column but uses a mortar mix that is significantly weaker than what is specified in the structural plans. The structural engineer specified Type S mortar and the mason used Type O mortar. What is the structural concern?

A. Type O mortar has significantly lower compressive and tensile strength than Type S mortar, and using Type O in a structural application may result in the column failing to support the specified beam loads
B. Type O and Type S mortars have identical structural properties and the substitution has no impact on the column's capacity
C. The mortar type affects only the color of the finished joints and has no relationship to the structural capacity of the column
D. Type O mortar is stronger than Type S mortar because the O designation indicates it is an optimized structural mortar formula

42. A contractor is managing a commercial project and the specifications require the contractor to submit product data for all specified materials before procurement. The contractor orders and installs light fixtures without submitting the product data for approval. The architect inspects and determines the installed fixtures do not match the design intent. What is the contractor's liability?

A. The architect must accept the installed fixtures because the contractor's selection represents an acceptable design interpretation
B. The contractor must accept the installed fixtures as a donation to the project because they cannot be returned after installation
C. The contractor must remove the non-conforming fixtures and install fixtures that match the architect's approved specifications at the contractor's expense because the contractor failed to follow the required submittal process
D. The building inspector must make the final determination on fixture selection because the architect has no authority over products

43. Under Oregon law, a contractor operating as a sole proprietor dies unexpectedly during an active residential construction project. The project is sixty percent complete. What happens to the contractor's CCB license and the unfinished project?

A. The CCB license terminates upon the death of the sole proprietor because the license was issued to that individual and is not transferable, and the homeowner must hire a new licensed contractor to complete the remaining work

B. The contractor's spouse automatically inherits the CCB license and may complete the project without obtaining a separate license
C. The CCB assigns the unfinished project to another licensed contractor in the same area at no additional cost to the homeowner
D. The license remains active for two years after the contractor's death to allow the estate to complete all active construction projects

44. A contractor is installing a commercial rooftop air handling unit. The unit weighs six thousand pounds and will be lifted by crane to the roof. Before the lift, the contractor must verify several critical factors. Which verification is most important for protecting the building structure during the equipment placement?

A. Verifying that the crane has adequate reach to place the unit without moving closer to the building during the lifting operation
B. Verifying that the rooftop delivery truck can access the site without damaging the landscaping adjacent to the building
C. Verifying that the unit's color matches the architect's specification for rooftop equipment visibility from the ground level
D. Verifying that the roof structure has adequate capacity to support the unit's weight at the planned location, including any concentrated loads from vibration isolation supports and the additional weight of snow and maintenance personnel

45. A contractor is building a residential home and the plans specify a tankless water heater. The homeowner asks the contractor to explain the energy efficiency advantage of a tankless water heater compared to a traditional tank-style water heater. What is the primary efficiency advantage?

A. Tankless water heaters heat water to a higher temperature than tank-style heaters, providing more hot water per gallon delivered
B. Tankless water heaters have larger heat exchangers that transfer energy more efficiently than the burners in tank-style units
C. Tankless water heaters eliminate standby energy losses because they heat water only on demand rather than maintaining a tank of hot water continuously, reducing the energy wasted keeping stored water at temperature
D. Tankless water heaters use less gas per BTU of heat output because the combustion process operates at higher pressures than tanks

46. A contractor is managing a commercial project and the structural engineer requires the contractor to install seismic expansion joints at the locations shown on the structural drawings.

The expansion joints separate the building into structurally independent sections. What is the primary purpose of these seismic joints?

A. To improve the building's acoustic performance by isolating vibration between adjacent tenant spaces during normal occupancy
B. To allow controlled thermal expansion of the building materials during summer heat without causing structural distress
C. To provide access for future building maintenance by creating permanent gaps between building sections for equipment passage
D. To allow adjacent building sections to move independently during an earthquake, preventing damage that would occur if the sections were rigidly connected and responded to seismic forces as different structural systems

47. A contractor is hired to install a residential septic system. The county health department approves the site evaluation and issues the septic permit. During installation, the contractor discovers that the soil conditions in the drain field area are significantly different from the test pit results documented in the site evaluation. The soil is much more clayey than expected. What should the contractor do?

A. Install the drain field as designed because the permit has been issued and the design cannot be modified after permit approval
B. Stop installation, notify the county health department and the system designer, and request a reevaluation of the site conditions because the drain field as designed may not function properly in the actual soil conditions
C. Add extra gravel around the drain field pipes to compensate for the reduced permeability of the clayey soil encountered on site
D. Install the drain field at a shallower depth to reach the more permeable soil layers that exist closer to the surface in all locations

48. A contractor is building a commercial structure and the fire protection plans require the installation of fire barriers between different occupancy types within the building. The building contains both office space and a restaurant. What is the minimum fire-resistance rating typically required for the fire barrier between these two different occupancy types?

A. A thirty-minute fire-resistance rating is the maximum required between any two occupancy types in commercial construction
B. The fire-resistance rating depends on the specific occupancy types and the applicable building code, but a one-hour or two-hour separation is typically required between different occupancy classifications
C. No fire barrier is required between office and restaurant occupancies because they are both classified as commercial use types

D. A four-hour fire barrier is required between all different occupancy types regardless of the specific occupancy classifications

49. A contractor is reviewing a commercial project's specifications and finds that the specifications require all structural steel to be fabricated from ASTM A992 steel. What is the significance of specifying ASTM A992 for structural steel?

A. ASTM A992 is a cosmetic specification that determines the surface finish and color of the structural steel members only
B. ASTM A992 specifies the minimum paint thickness required on all structural steel members before they leave the fabrication shop
C. ASTM A992 defines the minimum mechanical properties including yield strength and tensile strength for structural wide-flange shapes, ensuring the steel has the strength characteristics assumed in the structural design
D. ASTM A992 specifies the maximum permissible length of structural steel members that can be transported on public highways

50. A contractor is installing a commercial building's domestic water system. The specifications require the installation of a backflow prevention assembly on the building's water service connection. The local water authority requires annual testing and certification of the backflow prevention device. Who is typically responsible for the annual testing and certification after the building is occupied?

A. The contractor who installed the device is responsible for annual testing throughout the life of the building at no additional cost
B. The local water authority performs the annual testing as part of the standard water service provided to all commercial customers
C. The building owner or property manager is responsible for scheduling and paying for the annual testing and certification by a certified backflow tester as required by the local water authority
D. The backflow prevention device manufacturer provides free annual testing as part of the product warranty for the life of the device

51. A contractor is building a residential home and the electrical plans show a dedicated circuit for the bathroom receptacle outlets. Under the National Electrical Code, what type of protection is required for bathroom receptacle outlets in addition to the standard circuit breaker?

A. Ground-fault circuit interrupter protection is required for all bathroom receptacle outlets to protect occupants from electrical shock in the wet environment

B. Arc-fault circuit interrupter protection is the only special protection required for bathroom receptacle outlets in residential applications
C. Surge protection devices are the only additional protection required on bathroom receptacle circuits beyond the standard breaker
D. No additional protection beyond the standard circuit breaker is required for bathroom receptacles in modern residential construction

52. A contractor is managing a commercial project and the concrete subcontractor is placing a large structural mat foundation. The pour requires six hundred cubic yards of concrete and will take approximately eight hours to complete. What is the most critical quality control concern during a pour of this size and duration?

A. Ensuring the concrete truck drivers follow the correct delivery route from the batch plant to avoid traffic delays during placement
B. Monitoring the concrete temperature at the batch plant to ensure compliance with the contractor's preferred mix temperature range
C. Maintaining continuous placement without cold joints by coordinating multiple concrete trucks and ensuring each load is integrated with the previously placed concrete before it begins to set
D. Counting the total number of trucks that deliver concrete to verify the volume matches the order quantity placed with the supplier

53. A contractor is performing a residential renovation and the homeowner asks whether the existing wiring is adequate to support a new electric vehicle charging station in the garage. The charger requires a dedicated forty-ampere, two-hundred-forty-volt circuit. The existing electrical panel has available capacity. What must the contractor verify before installing the charger circuit?

A. Only the distance from the panel to the garage to determine the wire length needed for the dedicated circuit installation
B. The available panel capacity, the wire size required for a forty-ampere circuit at the run distance, the conduit routing, and whether the existing service can handle the additional load without exceeding its rated capacity
C. Only whether the homeowner owns or leases the electric vehicle because charger installations for leased vehicles require different permits
D. Only the charger manufacturer's color preference for the conduit routing between the panel and the garage charging location

54. A contractor is building a commercial structure and the mechanical specifications require the HVAC ductwork to be cleaned before the building is occupied. The cleaning must remove

all construction debris, dust, and contaminants from the duct interior. What standard governs the duct cleaning process for new construction?

A. ASHRAE standards do not address duct cleaning and the contractor may use any cleaning method they prefer for new construction
B. The Environmental Protection Agency requires all commercial ductwork to be cleaned by a certified EPA duct cleaning contractor
C. NADCA standards or the project specifications typically define the acceptable methods, procedures, and cleanliness levels for post-construction duct cleaning before the building is occupied
D. The building inspector performs the duct cleaning inspection using a standard flashlight examination through the register openings

55. A contractor is managing a residential project and the building inspector discovers that the stairway headroom does not meet the minimum requirement. The stairway has a headroom clearance of six feet four inches. Under most residential building codes, what is the minimum headroom clearance required over a stairway?

A. Six feet zero inches is the minimum headroom clearance for residential stairways under all building code editions and jurisdictions
B. Six feet four inches is the minimum headroom for residential stairways and the inspector's measurement meets the requirement
C. Seven feet zero inches is the minimum headroom for residential stairways, matching the standard room ceiling height requirement
D. Six feet eight inches is the generally required minimum headroom clearance over residential stairways, meaning the six-foot-four-inch measurement falls four inches short of the code requirement

56. A contractor is reviewing a commercial project's structural plans and finds that the engineer has specified a moment-resisting frame for the building's lateral force-resisting system. What type of forces is the moment frame designed to resist?

A. Only vertical gravity loads from the building's dead weight and the occupant live loads applied to each floor level of the structure
B. Only thermal expansion forces caused by temperature changes in the structural steel members during summer heating conditions
C. Only hydrostatic pressure from groundwater acting on the below-grade foundation walls and basement floor slab components
D. Lateral forces from wind pressure and seismic ground motion that act horizontally on the building structure, requiring the frame connections to resist rotation and transfer lateral loads to the foundation

57. A contractor is building a residential home and the plans call for a gas-fired tankless water heater. The manufacturer requires a category three stainless steel vent system for the condensing unit. The contractor installs a category one single-wall metal vent pipe instead. What safety hazard does this incorrect venting create?

A. The condensing water heater produces acidic condensate in the flue gases that will corrode the single-wall metal vent pipe from the inside, potentially causing flue gas leakage including carbon monoxide into the living space
B. The single-wall metal vent pipe provides superior draft characteristics compared to the stainless steel vent system specified
C. The incorrect vent material affects only the water heater's energy efficiency and poses no safety risk to building occupants
D. Category one and category three vent pipes are interchangeable for all residential gas appliance venting applications

58. Under Oregon law, a contractor is hired to perform residential construction work. The contract states that all disputes will be resolved through binding arbitration. During construction, a dispute arises over the quality of the tile work. The homeowner wants to file a CCB complaint instead of pursuing arbitration. Can the homeowner file a CCB complaint despite the arbitration clause?

A. Yes, the homeowner's right to file a CCB complaint is a statutory right that cannot be waived or limited by a contract provision, though the CCB process and the arbitration are separate proceedings
B. No, the binding arbitration clause prevents the homeowner from filing a CCB complaint for any reason during the project
C. Yes, but only if the homeowner waives all rights to any financial remedy through the CCB complaint process permanently
D. No, the CCB will refuse to accept the complaint and redirect the homeowner to the arbitration process specified in the contract

59. A contractor is managing a commercial project and the roofing subcontractor submits a claim for delay damages caused by the general contractor's failure to complete the parapet wall framing on schedule. The roofing subcontractor was unable to install the roofing membrane because the parapet walls were not ready. The subcontract does not contain a no-damage-for-delay clause. What is the subcontractor's right?

A. The subcontractor may only receive a time extension and cannot recover monetary damages for the delay under any circumstances

B. The subcontractor may recover delay damages from the general contractor because the delay was caused by the general contractor's failure to complete the prerequisite work on schedule and the subcontract does not bar monetary recovery
C. The subcontractor must absorb all delay costs because weather-related delays are always the subcontractor's risk on all projects
D. The subcontractor must file a construction lien against the building as the sole remedy for delay-related costs and damages

60. A contractor is building a commercial cold storage facility and the floor slab will be maintained at minus twenty degrees Fahrenheit. The structural engineer specifies an under-slab heating system to prevent frost heave. The contractor installs the insulation but does not install the heating system. Two years after construction, the floor slab begins to heave and crack. What caused the failure?

A. The insulation was installed incorrectly and allowed heat to transfer from the building interior to the soil beneath the slab
B. The floor slab was poured too thin for the applied loads and the cracking is unrelated to the soil temperature beneath the slab
C. The concrete mix design was inadequate for the cold storage temperatures and the cracking is caused by freeze-thaw of the slab
D. Without the heating system, the ground beneath the insulated slab froze over time, and the expanding ice lenses in the soil created upward pressure that heaved and cracked the floor slab

61. A contractor is reviewing a commercial project's specifications and discovers that the specifications reference the National Fire Protection Association standard NFPA 101, also known as the Life Safety Code. What primary subject matter does NFPA 101 address?

A. The design, installation, and maintenance requirements for all fire sprinkler systems in commercial and residential buildings
B. The minimum requirements for the means of egress, fire protection features, and building construction elements necessary to protect building occupants from fire and related hazards
C. The electrical wiring methods and materials requirements for all commercial and residential construction installations
D. The structural design requirements for buildings in high seismic zones and hurricane-prone regions of the United States

62. A contractor is building a residential home and the plans show a sill plate gasket between the concrete foundation and the wood sill plate. The contractor omits the sill plate gasket. What two functions does the sill plate gasket serve?

A. The gasket provides only a visual separation between the concrete and the wood and has no functional purpose in the assembly
B. The gasket prevents the contractor from over-tightening the anchor bolts and damaging the wood sill plate during installation
C. The gasket serves as a structural connector that increases the shear capacity of the sill plate to foundation connection
D. The gasket provides a moisture barrier preventing capillary water transfer from the concrete to the wood, and serves as an air barrier reducing air infiltration at the foundation-to-framing junction

63. A contractor is managing a commercial project and the owner requests that the contractor provide a project cost forecast showing the estimated final cost at completion. The current contract price is two million dollars, approved change orders total one hundred fifty thousand dollars, and the contractor anticipates an additional seventy-five thousand dollars in pending change orders. What is the estimated cost at completion?

A. Two million dollars because the original contract price is the only reliable basis for forecasting the final project cost
B. Two million two hundred twenty-five thousand dollars based on the current contract price plus all approved and anticipated change orders
C. Two million one hundred fifty thousand dollars based on the original contract price plus approved change orders only
D. Two million three hundred thousand dollars based on the estimated cost plus a ten percent contingency for unknown future changes

64. A contractor is performing a residential renovation and the existing home has single-pane windows throughout. The homeowner wants to replace them with energy-efficient double-pane windows. Under the Oregon energy code, what performance metric is used to evaluate the thermal efficiency of replacement windows?

A. The U-factor rating, which measures the rate of heat transfer through the window assembly, with lower U-factor values indicating better insulating performance and less heat loss
B. The visible transmittance rating, which measures the amount of natural light passing through the glass for daylighting purposes
C. The solar heat gain coefficient, which measures the amount of solar radiation transmitted through the glass during summer months
D. The condensation resistance factor, which measures the window's ability to prevent interior moisture during cold weather periods

65. A contractor is building a commercial structure and the specifications require the contractor to install seismic bracing on all suspended ceiling grid systems. The contractor installs the ceiling grid but does not install the required seismic bracing wires and compression struts. What hazard does this omission create?

A. The ceiling grid functions identically with or without seismic bracing because the suspension wires provide all necessary support
B. The unbraced ceiling grid will sag over time but does not present a falling hazard during seismic events or normal building use
C. During an earthquake, the unbraced ceiling grid can sway, separate from the wall angles, and collapse, creating a falling hazard that can injure building occupants and block egress paths
D. The seismic bracing is required only in seismic design categories D and above and Oregon does not fall within these categories

66. A contractor is managing a residential project and the homeowner provides their own appliances for the contractor to install. The contractor's employee drops the homeowner's refrigerator while moving it into the kitchen, denting the front panel. Under the contractor's general liability insurance, is this damage covered?

A. No, because owner-furnished items are specifically excluded from all contractor insurance policies regardless of the circumstances
B. No, because the homeowner's homeowner's insurance is the primary coverage for damage to appliances inside the residence
C. Yes, the contractor's commercial general liability policy typically covers damage to the homeowner's property caused by the contractor's negligence during installation activities
D. Yes, but only if the damage exceeds the contractor's insurance deductible and the homeowner files the claim within twenty-four hours

67. A contractor is building a commercial structure and the specifications require the contractor to install expansion tank systems on the building's hydronic heating piping. What is the primary function of an expansion tank in a hydronic heating system?

A. To store additional heating water for use during peak demand periods when the boiler cannot produce adequate hot water volume
B. To absorb the expansion of heated water in the closed piping system, preventing dangerous pressure buildup that could rupture pipes, fittings, or the boiler as the water temperature increases
C. To filter sediment and debris from the circulating heating water before it enters the boiler heat exchanger for recirculation
D. To provide a mixing point where hot water from the boiler blends with cooled return water to control supply temperature

68. Under Oregon law, a contractor is hired to construct a new commercial building. The building will be constructed on a site that was previously used as a gas station. Environmental Phase I and Phase II assessments indicate soil contamination from petroleum products. What regulatory requirement applies to construction on this contaminated site?

A. No regulatory requirements apply because the contamination was caused by the previous owner and the new owner has no liability
B. The contractor must obtain clearance from the Oregon Department of Environmental Quality and follow an approved remediation or management plan for the contaminated soil encountered during construction
C. The contamination is the responsibility of the petroleum industry and the contractor may proceed without regulatory involvement
D. The contractor must remove all soil from the site to a depth of ten feet and replace it with clean fill regardless of contamination depth

69. A contractor is building a residential home and the plans specify a two-car garage with a concrete floor slab. The building code requires the garage floor to slope toward the garage door opening for drainage. What is the purpose of this slope requirement?

A. The slope improves the visual appearance of the garage floor by creating a more dynamic surface plane than a flat installation
B. The slope allows vehicles to roll into the garage without engine power, reducing wear on the vehicle's transmission system
C. The slope prevents oil stains by directing all spilled fluids to the front of the garage where they evaporate more quickly
D. The slope directs water from rain, snowmelt, and vehicle wash toward the garage door opening rather than allowing it to pond inside the garage, preventing moisture damage and maintaining a dry interior environment

70. A contractor is managing a commercial project and the fire protection engineer specifies a pre-action fire sprinkler system for the building's data center. How does a pre-action sprinkler system differ from a standard wet-pipe sprinkler system?

A. A pre-action system uses a different type of sprinkler head that is specifically designed for electronic equipment applications
B. A pre-action system has larger diameter piping than a wet-pipe system to deliver more water volume when the system activates
C. A pre-action system uses a special fire-suppressing fluid instead of water to protect electronic equipment from liquid damage

D. A pre-action system holds the piping dry until a separate detection system confirms a fire condition, then fills the piping with water, reducing the risk of accidental water discharge from a single sprinkler head failure

71. A contractor is performing a commercial renovation and the architect specifies polished concrete floors in the lobby area. The existing concrete slab is in good condition but has numerous hairline cracks. The contractor proceeds with polishing without addressing the cracks. What will happen during the polishing process?

A. The polishing process seals all hairline cracks and produces a uniform, crack-free finished surface in all concrete applications
B. The hairline cracks will become more visible and prominent after polishing because the polishing process highlights surface imperfections, and the contractor should have discussed the crack treatment options with the owner before polishing
C. Polished concrete is not suitable for slabs with any cracks and the contractor should have rejected the specification before starting
D. The cracks have no visual impact on the polished floor because the densifier applied during polishing fills all hairline cracks

72. A contractor is building a residential addition and the plans require the addition's roof to tie into the existing roof. The contractor must remove a section of the existing roofing to make the connection. During the tie-in, the contractor leaves the existing roof exposed to weather overnight without temporary protection. An unexpected rainstorm causes water damage to the homeowner's existing bedroom below the exposed roof section. Who is liable for the water damage?

A. The homeowner is liable because the homeowner should have known the roof would be exposed during the construction process
B. The weather service is liable because they failed to accurately forecast the rainstorm that caused the water damage
C. The roofing material manufacturer is liable because the existing roofing should have been waterproof even after partial removal
D. The contractor is liable because the contractor has a duty to protect the existing structure from weather damage during construction, and failing to install temporary weatherproofing before leaving the roof exposed was negligent

73. A contractor is managing a commercial project and the specifications require the contractor to submit a construction waste management plan. The plan must document the types of waste generated, the estimated quantities, and the recycling and disposal methods. What is the minimum waste diversion rate typically required by green building standards?

A. Most green building standards and many local ordinances require a minimum waste diversion rate of fifty to seventy-five percent of construction waste from landfill disposal through recycling and reuse
B. Green building standards require one hundred percent waste diversion with zero construction waste sent to landfills on all projects
C. The minimum diversion rate is ten percent because most construction waste materials cannot be recycled or reused effectively
D. No minimum diversion rate exists and waste management plans are informational documents with no enforceable diversion targets

74. A contractor is installing a commercial building's plumbing system and the specifications require the contractor to install water hammer arrestors on quick-closing valves such as solenoid valves on washing machines and dishwashers. What is water hammer and why are arrestors needed?

A. Water hammer is the noise caused by water flowing through undersized pipes and arrestors increase the pipe diameter at each valve
B. Water hammer is the buildup of mineral deposits inside pipes that restricts water flow and arrestors filter the minerals out
C. Water hammer is a pressure surge caused by the sudden stoppage of water flow when a valve closes quickly, and the resulting shock wave can damage pipes, fittings, and equipment, which is why arrestors are installed to absorb the pressure spike
D. Water hammer is the vibration of loose pipes against framing members and arrestors are rubber isolation mounts that decouple pipes

75. A contractor is building a residential home and the plans show a main electrical panel in the garage and a sub-panel in the addition. The sub-panel is fed by a feeder from the main panel. Under the National Electrical Code, what grounding requirement applies to the sub-panel?

A. The sub-panel must have a separate equipment grounding conductor from the main panel, and the neutral bus and ground bus must be isolated from each other in the sub-panel
B. The sub-panel may use the neutral conductor as the equipment ground because the panels are in the same building structure
C. The sub-panel requires no grounding connection because the main panel's grounding system protects all downstream panels
D. The sub-panel must have its neutral and ground buses bonded together just like the main panel's neutral and ground configuration

76. Under Oregon law, a contractor who holds a residential endorsement on their CCB license wants to perform work on a commercial project. The commercial project involves tenant improvements in an existing office building. Can the contractor perform this work with only a residential endorsement?

A. No, commercial tenant improvement work requires a commercial endorsement on the CCB license, and the contractor must obtain the appropriate commercial endorsement before performing work on commercial projects
B. Yes, because tenant improvements are classified as interior remodeling which falls under the residential endorsement category
C. Yes, because all CCB licenses automatically authorize both residential and commercial work without additional endorsements
D. No, but the contractor may perform the work under the supervision of a commercially endorsed contractor on the same site

77. A contractor is managing a commercial project and the building's HVAC system includes a cooling tower. The cooling tower requires water treatment to prevent scale buildup, biological growth, and corrosion in the condenser water piping. The contractor installs the cooling tower but does not install the specified water treatment system. What operational problems will develop?

A. The cooling tower operates normally without water treatment because modern cooling towers are manufactured with corrosion-resistant materials
B. The missing water treatment has no operational impact because the municipal water supply is already treated and safe for use
C. Without water treatment, scale buildup reduces heat transfer efficiency, biological growth including Legionella bacteria creates health hazards, and corrosion damages the piping and equipment, leading to premature system failure and potential liability
D. The water treatment system is an optional energy-saving measure and its absence affects only the building's energy certification

78. A contractor is building a residential home and the plans call for a concrete slab-on-grade with radiant floor heating. The heating system consists of PEX tubing embedded in the concrete slab. After the tubing is installed but before the concrete is placed, what critical test must be performed?

A. An electrical continuity test to verify the PEX tubing has no breaks that would cause short circuits in the heating system
B. A thermal imaging scan of the tubing layout to verify the tube spacing matches the mechanical engineer's design specifications

C. A pressure test of the PEX tubing system to verify that all connections are watertight and no leaks exist before the tubing is permanently encased in concrete, because leaks cannot be accessed after the slab is poured
D. A flow rate test to verify the pump can circulate water through the tubing at the designed velocity before the concrete is placed

79. A contractor is managing a commercial project and the owner asks the contractor to explain the concept of project delivery method. The owner is considering design-build versus design-bid-build. What is the most significant advantage of design-build for the owner?

A. Design-build always costs less than design-bid-build because the single contract eliminates the competitive bidding process entirely
B. Design-build provides a single point of responsibility for both design and construction, which can reduce project duration, improve coordination between design and construction, and provide earlier cost certainty
C. Design-build eliminates the need for building permits because the design-build contractor assumes all regulatory compliance duties
D. Design-build allows the owner to select the architect and contractor independently, ensuring the best qualified team for each phase

80. A contractor is building a residential home and the building code requires the installation of tempered glass in all windows located within twenty-four inches of a door. The contractor installs standard annealed glass in a sidelight window that is eighteen inches from the front door. What safety concern does this create?

A. A person walking toward or opening the door could accidentally walk into or impact the sidelight glass, and standard annealed glass would shatter into large sharp shards causing severe lacerations, which is why tempered safety glass is required in these hazardous locations
B. The annealed glass in the sidelight provides identical impact resistance to tempered glass in all residential door applications
C. The twenty-four-inch rule applies only to commercial buildings and residential sidelights are exempt from safety glazing codes
D. The annealed glass is acceptable if the contractor applies a safety window film that prevents the glass from shattering on impact

Practice Exam 23: Answer Key and Explanations

1. B — The structural engineering design for bearing wall removal must be provided by a licensed structural engineer, and this responsibility typically falls on the homeowner or their architect. The contractor should inform the homeowner that structural engineering is required before the bearing walls can be removed because the replacement beams must be sized for the

specific loads and spans. A CCB license does not include authority to perform structural engineering.

2. B — OSHA guidelines caution against safety incentive programs that discourage injury reporting by rewarding injury-free periods. Programs that reward proactive safety behaviors such as hazard identification, near-miss reporting, safety training completion, and safety committee participation promote a genuine safety culture without creating incentives to hide injuries. Rate-based programs can violate OSHA's recordkeeping requirements.

3. C — The Oregon Residential Specialty Code generally requires attic access openings to be a minimum of twenty-two inches by thirty inches when the attic has at least thirty inches of vertical clearance above the insulation. This size allows maintenance personnel to enter the attic space for inspection and repair of mechanical equipment, wiring, and insulation. Undersized access openings restrict maintenance access and fail inspection.

4. C — A field order typically addresses minor adjustments that do not change the contract price or time, such as slight relocations or clarifications of the design intent. A change order formally modifies the contract by adjusting the price, time, or both and requires signatures from the authorized parties. Understanding the distinction prevents disputes over whether scope changes were authorized with cost and time implications.

5. B — The minimum setback distance for propane tanks is determined by the tank size and the applicable fire code. For a two-hundred-gallon above-ground residential tank, the typical setback is ten feet from the building, though the specific distance must be verified with the authority having jurisdiction. These setback requirements protect the building from radiant heat exposure in the event of a tank fire or leak.

6. A — Oregon law requires employers to provide written notice of employment terms including the pay rate, pay schedule, and other mandatory information at the time of hire. Failure to provide this written notice exposes the contractor to penalties from the Bureau of Labor and Industries. Verbal communication alone does not satisfy the statutory requirement for written employment documentation.

7. B — Non-galvanized hollow metal doors and frames lack the zinc protective coating that prevents rust and corrosion when exposed to exterior weather conditions. Moisture, humidity, and salt air accelerate corrosion of unprotected steel, causing the doors and frames to deteriorate, bind, and eventually fail. Galvanizing provides long-term corrosion protection that extends the service life of exterior steel components.

8. A — Clean agent fire suppression systems use gaseous agents that suppress fire without water, leaving no residue and causing no damage to sensitive electronic equipment. Water from a standard sprinkler system would destroy servers, networking equipment, and stored data. The clean agent displaces oxygen or chemically interrupts combustion while protecting the valuable electronic assets in the server room.

9. D — Total roof area is two planes times forty feet times sixteen feet, equaling one thousand two hundred eighty square feet. Each plywood sheet covers thirty-two square feet, so one thousand two hundred eighty divided by thirty-two equals forty sheets. Adding five percent waste yields forty-two sheets. The waste factor accounts for cutting, fitting, and material damaged during installation.

10. D — If fire-rated corridor walls stop at the ceiling grid, fire and smoke can travel through the open plenum space above the ceiling and bypass the fire-rated barrier entirely. The wall must extend continuously from the floor to the underside of the floor or roof deck above to create a complete fire compartment. The ceiling grid alone does not provide fire-rated separation.

11. A — Glulam beams are engineered wood products that are susceptible to moisture damage when exposed to weather without protection. Rain absorption causes swelling and potential delamination of the adhesive bonds between laminations, while sun exposure causes surface checking and warping. The contractor must store glulam beams off the ground on blocking with protective covering to maintain their structural integrity and appearance.

12. D — Oregon law allows the homeowner to deposit a surety bond or cash deposit with the court to release the construction lien from the property title while the underlying payment dispute is resolved through legal proceedings. This process transfers the lien from the real property to the deposited funds, clearing the title so the property can be sold or refinanced. The lien dispute continues against the deposited security.

13. B — Horizontal cracking at floor line locations in brick veneer typically indicates that the veneer lacks properly positioned shelf angles that transfer the masonry weight at each floor level to the building's structural frame. Without shelf angles, the accumulated weight of multiple stories of brick exceeds the veneer's capacity, causing horizontal tension cracks at the floor lines where the loads concentrate.

14. D — A fixed-price contract places the cost risk on the contractor because the contractor must complete the work for the agreed price regardless of actual costs incurred. A cost-plus contract places the cost risk on the homeowner who pays actual documented costs plus the contractor's fee, with no guaranteed total price unless a guaranteed maximum price is included. This fundamental risk allocation drives contract type selection.

15. C — An eighty-percent AFUE furnace does not meet the minimum efficiency requirements of the current energy code, which typically requires ninety percent or higher for gas furnaces. The installation will fail the mechanical inspection because the equipment does not comply with the code. Additionally, the homeowner pays approximately twenty percent more in heating costs compared to the specified ninety-six-percent unit.

16. D — Concrete typically reaches sixty-five to seventy-five percent of its twenty-eight-day design strength by day seven. A seven-day result of only forty percent is below this expected range and suggests a potential issue with the concrete mix, curing conditions, or testing procedures. The contractor should investigate the cause and closely monitor the twenty-eight-day test results to determine if corrective action is needed.

17. A — Standard annealed glass breaks into large, sharp shards that can cause severe lacerations, which is why the building code requires tempered or laminated safety glazing in shower enclosures and other hazardous locations. Tempered glass crumbles into small, relatively harmless fragments when broken, significantly reducing injury risk. This safety requirement protects occupants in wet, slippery environments where falls against glass are foreseeable.

18. A — The LEED Water Efficiency category specifically evaluates strategies for reducing potable water consumption including low-flow plumbing fixtures, efficient irrigation systems, rainwater harvesting, and graywater reuse. Credits are awarded based on the percentage of water reduction achieved compared to a baseline building. This category addresses indoor and outdoor water use separately.

19. B — Without proper flashing above the ledger board, water runs down the house wall and infiltrates the gap between the ledger and the house framing. This trapped moisture causes wood rot, mold growth, and progressive deterioration of the ledger connection. Ledger connection failure due to wood rot is one of the most common causes of deck collapse, making proper flashing a critical safety requirement.

20. B — Compacting structural fill to ninety-five percent of maximum dry density ensures the fill material achieves adequate density and bearing capacity to support the building loads without excessive settlement. Insufficiently compacted fill can settle unevenly under building loads, causing foundation movement, structural cracking, and building damage. The modified Proctor test establishes the reference standard for maximum achievable density.

21. D — The contractor must notify the civil engineer that the actual soil conditions do not match the assumptions used in the bioretention basin design. Heavy clay soil has very low permeability and cannot infiltrate stormwater at the rate assumed in the design. The engineer may need to incorporate an underdrain system that collects water that cannot infiltrate and routes it to the storm drain system.

22. A — The contractor must install the required fire-rated floor-ceiling assembly using materials and methods that achieve the specified one-hour fire-resistance rating. The fire separation between a garage and living space is a life safety requirement that protects occupants from fire and toxic fumes originating in the garage. No paint, sprinkler system, or variance eliminates this fundamental fire separation requirement.

23. D — The subcontractor is primarily responsible for their own employees' PPE compliance, but the general contractor also has a duty to ensure safe conditions across the entire construction site. When the general contractor observes subcontractor workers without required PPE in a traffic area, the general contractor should address the hazard by notifying the subcontractor and requiring immediate compliance to protect all workers on the site.

24. A — Whole-house surge protection devices protect the home's electrical system and connected appliances from voltage spikes caused by lightning, utility switching, and other transient events. These voltage surges can damage sensitive electronics, HVAC equipment, and appliance control boards. The device clamps excessive voltage at the electrical panel before it reaches the home's branch circuits.

25. C — An NRC rating of zero-point-five-five absorbs significantly less sound energy than the specified zero-point-eight-five rating, resulting in increased reverberation, echo, and background noise in the occupied space. The lower-rated tiles reflect more sound back into the room rather than absorbing it. This deficiency may make the space unsuitable for its intended use, particularly in conference rooms and open offices.

26. B — The drilled hole must be thoroughly cleaned of drilling dust and debris before the adhesive is injected because contamination prevents the adhesive from bonding properly to the

concrete surface. Dust particles create a weak boundary layer between the adhesive and the concrete that dramatically reduces the anchor's pullout capacity. Proper hole cleaning is the most critical step in adhesive anchor installation.

27. C — Test and balance ports allow the balancing technician to insert pitot tubes, anemometers, and other measurement instruments into the ductwork to measure airflow velocity and calculate the volume of air flowing through each branch. These measurements are compared to the mechanical engineer's design specifications and dampers are adjusted to ensure each zone receives the correct air volume for proper heating and cooling.

28. D — Anchor bolt pullout resistance is directly related to the embedment depth in the concrete. Reducing the embedment from seven inches to four inches significantly decreases the concrete's ability to resist the pullout forces generated by wind uplift and seismic overturning. The shallow bolt may pull out of the concrete before reaching its design tensile capacity, compromising the building's structural connection to the foundation.

29. D — An impaired worker on a construction site poses a serious safety hazard to themselves and all other workers in the area due to impaired judgment, coordination, and reaction time. The contractor must remove the employee from the worksite immediately and follow the company's substance abuse policy and applicable employment law. Construction sites present inherent dangers that require alert, unimpaired workers at all times.

30. C — A flat parking deck without slope allows water to pond on the surface, accelerating concrete deterioration through freeze-thaw cycling and chloride penetration from deicing salts. Standing water creates slip hazards for pedestrians and can leak through cracks and joints to the levels below. The quarter-inch-per-foot minimum slope directs water to floor drains or the deck perimeter for proper drainage.

31. A — Constant volume terminal units deliver the same airflow regardless of the zone's actual heating or cooling demand. This wastes energy by overcooling or overheating unoccupied or lightly occupied zones that don't need full airflow. Variable air volume units modulate airflow based on the thermostat demand in each zone, significantly reducing energy consumption and meeting energy code requirements for demand-based ventilation.

32. B — Without filter fabric, fine soil particles migrate into the gravel drainage bed through water flow and gravity over time. These particles fill the void spaces in the gravel and clog the perforations in the drain pipe, eventually rendering the drainage system ineffective. As the drainage fails, hydrostatic pressure builds behind the retaining wall, which can cause structural failure.

33. A — The warranty period begins at the date of substantial completion as defined in the contract specifications, regardless of when the punch list work is completed. Substantial completion is the recognized milestone that triggers the warranty clock because the building is sufficiently complete for the owner to occupy and use it. Punch list items are minor corrections that do not prevent the building from functioning.

34. A — The general contractor is responsible to the homeowner for all work performed on the residential project, including work performed by subcontractors. The CCB may hold the general contractor accountable for the plumbing subcontractor's defective work because the

general contractor assumed responsibility for the entire project scope. The general contractor may then seek recovery from the subcontractor through the subcontract.

35. C — Duct smoke detectors monitor the HVAC supply and return air streams for the presence of smoke. When smoke is detected, the system shuts down the air handling equipment to prevent the HVAC system from distributing smoke throughout the building via the ductwork. This prevents smoke from spreading to unaffected areas and protects building occupants who are remote from the fire location.

36. C — Standard cloth duct tape uses a rubber-based adhesive that deteriorates from temperature cycling and continuous airflow exposure, causing the tape to dry out, crack, and release from the duct surface. Once the tape fails, the duct joints open and leak conditioned air into unconditioned spaces. The energy code requires mastic sealant or UL-listed duct tape that maintains a permanent, airtight seal.

37. B — The markup percentage for the contractor's own work on change orders is defined in the contract's general conditions and typically ranges from ten to fifteen percent for combined overhead and profit. This percentage is negotiated and agreed upon before the contract is signed, providing a transparent and predetermined rate that applies to all change order work throughout the project.

38. D — The continuous load path requires connectors at every level to transfer forces from the roof through the walls to the foundation. Without hurricane straps at the rafter connections and hold-down hardware at the wall-to-foundation connections, the load path is broken at multiple points. The structure cannot resist wind uplift or seismic overturning forces because the connections that transfer these forces are missing.

39. B — The architect certified the application on December fifth, and the owner has fifteen calendar days from certification to make payment. December fifth plus fifteen days equals December twentieth. This calculation follows the contract's payment timeline and ensures the contractor receives payment within a predictable timeframe after the architect verifies the work progress.

40. C — The production and import of R-twenty-two refrigerant has been phased out under the Clean Air Act due to its ozone-depleting properties. New equipment must use approved alternative refrigerants such as R-four-ten-A or R-four-zero-seven-C. However, existing R-twenty-two from recycled or reclaimed sources may still be used to service existing equipment until the equipment is replaced.

41. A — Type O mortar has significantly lower compressive and bond strength compared to Type S mortar. Using Type O in a structural application where Type S is specified means the masonry column may not achieve the load-carrying capacity required by the structural design. Mortar type selection directly affects the structural performance of masonry assemblies and must match the engineer's specification.

42. C — The contractor failed to follow the required submittal process by ordering and installing light fixtures without obtaining the architect's approval of the product data. The installed fixtures do not match the design intent, and the contractor must remove them and install approved fixtures at the contractor's expense. The submittal process exists to prevent exactly this type of costly error.

43. A — A CCB license issued to a sole proprietor terminates upon the individual's death because the license was issued to that specific person and cannot be inherited or transferred. The homeowner must hire a new licensed contractor to complete the remaining work. The contractor's surety bond may provide financial protection if the homeowner suffers losses from the incomplete project.

44. D — Before placing a six-thousand-pound air handling unit on the roof, the contractor must verify that the roof structure has adequate capacity to support the equipment weight at the specific planned location. The structural verification must account for concentrated loads at the vibration isolation support points, additional weight from snow accumulation, and live loads from maintenance personnel accessing the equipment.

45. C — Tankless water heaters eliminate standby energy losses because they heat water only when a fixture is opened, rather than continuously maintaining a tank of hot water at temperature. Traditional tank heaters consume energy twenty-four hours a day to keep the stored water hot, even when no hot water is being used. This on-demand heating approach can reduce water heating energy consumption by twenty to thirty percent.

46. D — Seismic expansion joints separate the building into structurally independent sections that can respond independently to earthquake ground motion. Different building sections may have different structural characteristics such as height, mass, or stiffness that cause them to vibrate at different frequencies during an earthquake. Without separation, the sections would pound against each other, causing severe structural damage.

47. B — The contractor must stop installation and notify the county health department and system designer because the actual soil conditions are significantly different from the test pit results used to design the drain field. Clayey soil has much lower permeability than expected, meaning the drain field as designed may not be able to absorb the effluent volume. A redesign or alternative system type may be required.

48. B — The fire-resistance rating required between different occupancy types depends on the specific occupancy classifications involved and the applicable building code provisions. Office and restaurant occupancies have different fire hazard profiles, and the code typically requires a one-hour or two-hour fire barrier between them. The specific requirement must be determined from the applicable code based on the occupancy types and building construction type.

49. C — ASTM A992 defines the minimum mechanical properties for structural wide-flange steel shapes, including a minimum yield strength of fifty thousand psi and a minimum tensile strength of sixty-five thousand psi. The structural engineer's design calculations are based on these material properties, and specifying ASTM A992 ensures the steel delivered to the project has the strength characteristics assumed in the structural analysis.

50. C — After the building is occupied, the building owner or property manager is responsible for scheduling and paying for the annual testing and certification of the backflow prevention device by a certified tester. The local water authority requires this annual testing to verify the device is functioning properly and protecting the public water supply from contamination. Failure to maintain certification can result in water service disconnection.

51. A — GFCI protection is required for all bathroom receptacle outlets because bathrooms are wet environments where the risk of electrical shock is significantly elevated. Water on

hands, wet floors, and proximity to bathtubs and sinks create conditions where ground fault current can flow through a person. GFCI devices detect current imbalances as small as five milliamps and disconnect power within milliseconds.

52. C — During a large continuous pour lasting eight hours, maintaining continuous concrete placement without cold joints is the most critical quality control concern. Each new load must be integrated with the previously placed concrete before it begins initial set. Cold joints create planes of weakness that reduce the structural capacity of the mat foundation and can cause cracking and water infiltration.

53. B — The contractor must verify the available panel capacity and the existing service's ability to handle the additional forty-ampere load, determine the correct wire size for the circuit at the specific run distance to avoid excessive voltage drop, plan the conduit routing from the panel to the garage, and confirm the total service demand with the new circuit does not exceed the service rating.

54. C — NADCA (National Air Duct Cleaners Association) standards or the project specifications typically define the acceptable methods, procedures, and cleanliness levels for post-construction duct cleaning. These standards specify visual cleanliness criteria, acceptable cleaning methods, and verification procedures. Proper duct cleaning removes construction debris that would otherwise be distributed through the building when the HVAC system operates.

55. D — The generally required minimum headroom clearance over residential stairways is six feet eight inches, measured vertically from the stair nosing to the ceiling or soffit above. The measured clearance of six feet four inches falls four inches short of this requirement, which means taller occupants could strike their heads when using the stairway. The contractor must modify the framing to achieve the minimum clearance.

56. D — A moment-resisting frame is designed to resist lateral forces from wind pressure and seismic ground motion that act horizontally on the building structure. The moment connections at beam-to-column joints resist rotation and transfer lateral forces through the frame to the foundation. This is one of several lateral force-resisting systems allowed by the building code for commercial structures.

57. A — Condensing water heaters produce acidic flue gas condensate that rapidly corrodes standard single-wall metal vent pipe from the interior. A corroded vent pipe can develop holes that leak combustion gases, including carbon monoxide, into the living space. Category three stainless steel vent pipe is specifically designed to resist the acidic condensate and maintain its integrity over the equipment's service life.

58. A — The homeowner's right to file a CCB complaint is a statutory consumer protection right that exists independently of any contractual dispute resolution provisions. The arbitration clause governs the contractual dispute between the parties, but the CCB complaint process is a separate regulatory mechanism. Both proceedings may occur simultaneously because they serve different purposes.

59. B — When the subcontract does not contain a no-damage-for-delay clause, the subcontractor retains the right to recover monetary damages for delays caused by the general contractor's failure to complete prerequisite work on schedule. The delay was directly caused

by the general contractor's late completion of the parapet walls, which is a breach of the general contractor's coordination obligation. The subcontractor must document all delay-related costs.

60. D — Without the under-slab heating system, the extremely cold slab temperature migrated through the insulation and gradually froze the ground beneath the building. Ice lenses formed in the soil as groundwater migrated to the freezing front, expanding and creating upward pressure that exceeded the slab's resistance. This frost heave process caused the slab to lift and crack, exactly the failure the heating system was designed to prevent.

61. B — NFPA 101, the Life Safety Code, establishes minimum requirements for the means of egress, fire protection features, and building construction elements necessary to protect building occupants from fire and related hazards. The code addresses exit access, exit pathways, exit discharge, fire alarm and detection systems, and occupancy-specific requirements. It is one of the most widely adopted fire safety codes in the United States.

62. D — The sill plate gasket serves two critical functions: it acts as a moisture barrier preventing capillary water transfer from the concrete foundation to the wood sill plate, and it serves as an air barrier reducing air infiltration at the foundation-to-framing junction. Without the gasket, moisture wicks from the concrete into the wood causing rot, and air infiltrates through the irregular gap between the concrete and the sill plate.

63. B — The estimated cost at completion includes the original contract price of two million dollars plus approved change orders of one hundred fifty thousand dollars plus anticipated pending change orders of seventy-five thousand dollars, totaling two million two hundred twenty-five thousand dollars. This forecast gives the owner an early indication of the final project cost so financing and budget decisions can be made proactively.

64. A — The U-factor measures the rate of heat transfer through the complete window assembly including the glass, frame, and spacer. Lower U-factor values indicate better insulating performance because less heat escapes through the window. The Oregon energy code specifies maximum U-factor values by climate zone, and replacement windows must meet or exceed these requirements.

65. C — During an earthquake, an unbraced suspended ceiling grid can sway laterally, separate from the perimeter wall angles, and collapse onto building occupants below. The falling ceiling components create a direct injury hazard and can block egress paths, preventing occupants from evacuating safely. Seismic bracing stabilizes the ceiling grid and prevents it from separating during seismic ground motion.

66. C — The contractor's commercial general liability insurance typically covers damage to the homeowner's existing property caused by the contractor's negligence during operations. Dropping the homeowner's refrigerator constitutes negligent handling of third-party property during the installation process. The CGL policy responds to this type of property damage claim arising from the contractor's work activities.

67. B — As water in a closed hydronic heating system is heated, it expands significantly. Without an expansion tank to absorb this volume increase, the expanding water creates dangerous pressure buildup that can rupture pipes, fittings, valves, or the boiler itself. The expansion tank contains a pressurized air bladder that compresses as the heated water expands, safely accommodating the volume change.

68. B — Construction on a site with known petroleum contamination requires regulatory oversight from the Oregon Department of Environmental Quality. The contractor must follow an approved contaminated soil management plan that addresses excavation procedures, soil handling, testing requirements, disposal at approved facilities, and worker health and safety protocols. Proceeding without DEQ clearance can result in environmental violations and significant liability.

69. D — The garage floor slope directs water from rain tracking in on vehicles, snowmelt, and vehicle washing toward the garage door opening rather than allowing it to pond inside the garage. Standing water in a garage can damage stored items, promote mold growth, deteriorate the concrete surface, and create slip hazards. The slope ensures water drains out through the door opening by gravity.

70. D — A pre-action sprinkler system holds the piping dry until a separate smoke or heat detection system confirms a fire condition. Only after the detection system activates does the pre-action valve open and fill the piping with water. This two-step activation process reduces the risk of accidental water discharge from a single broken sprinkler head, which is critical in data centers where water damage to equipment would be catastrophic.

71. B — The polishing process grinds and refines the concrete surface, which makes existing hairline cracks more visible and prominent rather than concealing them. The densifier applied during polishing does not fill cracks. The contractor should have discussed crack treatment options such as crack filling, epoxy injection, or decorative scoring with the owner before beginning the polishing process.

72. D — The contractor has a duty to protect the homeowner's existing property from damage during construction, including weather protection when the building envelope is opened. Leaving a roof exposed to weather overnight without temporary waterproofing is negligent. The contractor should have installed temporary tarps or membrane before leaving the site to prevent water damage from any weather event.

73. A — Most green building standards and many local ordinances require a minimum construction waste diversion rate of fifty to seventy-five percent from landfill disposal. The specific target depends on the certification system and local requirements. Common recyclable construction materials include wood, metal, concrete, drywall, cardboard, and plastic, which together can achieve high diversion rates.

74. C — Water hammer is a pressure surge created when water flowing through a pipe is suddenly stopped by a quick-closing valve. The kinetic energy of the moving water converts to pressure energy, creating a shock wave that travels through the piping system. Water hammer arrestors contain a sealed air chamber that compresses to absorb the pressure spike, protecting pipes, fittings, and equipment from damage.

75. A — The NEC requires sub-panels to have a separate equipment grounding conductor from the main panel, and the neutral bus and ground bus must be isolated from each other in the sub-panel. In the main panel, the neutral and ground buses are bonded together, but this bonding must occur at only one point in the system. Bonding neutral and ground in the sub-panel creates parallel return paths that can cause dangerous ground faults.

76. A — Oregon CCB licenses have specific endorsement categories that define the type of work the contractor is authorized to perform. A residential endorsement does not authorize commercial construction work. The contractor must obtain the appropriate commercial endorsement on their CCB license before performing tenant improvements or any other commercial construction work.

77. C — Without water treatment, mineral scale builds up on heat exchange surfaces reducing cooling efficiency, biological growth including potentially deadly Legionella bacteria proliferates in the warm water environment, and corrosion attacks the piping, valves, and equipment. These combined effects reduce system performance, create health hazards, and cause premature equipment failure requiring costly replacement.

78. C — A pressure test of the PEX tubing system must be performed before the concrete is poured to verify that all connections are watertight and no leaks exist in the system. Once the tubing is permanently encased in concrete, any leaks are virtually impossible to access and repair without demolishing the slab. The pressure test is the last opportunity to verify system integrity before the tubing becomes inaccessible.

79. B — Design-build provides a single point of responsibility for both design and construction under one contract, which can reduce project duration by overlapping design and construction phases, improve coordination by eliminating the adversarial separation between designer and builder, and provide earlier cost certainty through guaranteed pricing before the design is fully complete.

80. A — A person walking toward or opening the front door could accidentally impact the adjacent sidelight glass. Standard annealed glass shatters into large, sharp shards that can cause severe lacerations and life-threatening injuries. Tempered safety glass is required within twenty-four inches of doors because it crumbles into small, relatively harmless fragments when broken, significantly reducing the risk of serious injury.