PRACTICE EXAM 22: OREGON CCB SIMULATION (80 QUESTIONS)

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

1. A contractor wins a bid for a public works project in Oregon valued at two hundred seventy-five thousand dollars. The contracting agency requires both a performance bond and a payment bond. Under Oregon public contracting law, what is the minimum bond amount the contractor must provide for each bond?

A. Each bond must equal the full contract amount, meaning the contractor must provide a performance bond and a payment bond each at one hundred percent of the contract price
B. The performance bond must equal seventy-five percent of the contract price and the payment bond must equal fifty percent
C. Each bond must equal fifty percent of the contract price for a combined total of one hundred percent across both bonds
D. The performance bond must equal one hundred percent but the payment bond is optional on projects under three hundred thousand

2. A contractor is managing a residential project and the homeowner's neighbor complains that construction noise begins before the time allowed by the local noise ordinance. The contractor has been starting work at six-thirty in the morning, but the local ordinance restricts construction noise to between seven in the morning and seven in the evening on weekdays. What should the contractor do?

A. Continue the early start because the noise ordinance applies only to commercial construction projects and not residential work
B. Ignore the neighbor's complaint because the homeowner, not the contractor, is responsible for neighborhood relations
C. File a noise variance application with the local jurisdiction and continue the early starts while the application is pending
D. Adjust the work schedule to comply with the local noise ordinance by starting noisy construction activities no earlier than seven in the morning

3. Under Oregon law, a contractor enters into a residential contract and collects a down payment. The contract specifies a payment schedule tied to construction milestones. The contractor collects the second milestone payment before completing the work associated with that milestone. What legal risk does this create?

A. Collecting payment ahead of the work associated with that milestone may constitute a violation of Oregon's contractor regulations and could be considered a deceptive practice if the work is not promptly completed
B. No legal risk exists because the contract payment schedule is a guideline and the contractor may collect payments in any order
C. The risk is limited to a late fee that the homeowner may assess against the contractor for premature payment collection
D. The only consequence is that the homeowner may withhold the next milestone payment until the contractor catches up to schedule

4. A contractor is estimating a commercial project and needs to calculate the concrete volume for a rectangular column footing. The footing is six feet long, six feet wide, and two feet deep. How many cubic yards of concrete does this single footing require?

A. Approximately two-point-seven cubic yards based on the footing volume of seventy-two cubic feet divided by twenty-seven cubic feet per yard
B. Approximately four-point-zero cubic yards based on the footing volume plus a twenty-five percent waste factor for placement loss
C. Approximately one-point-three cubic yards based on calculating only the column pedestal portion of the footing assembly
D. Approximately six-point-zero cubic yards based on the footing dimensions multiplied by a standard over-excavation allowance

5. A contractor is building a residential home and the plans specify a two-hundred-ampere electrical service. During the electrical rough-in, the contractor's electrician installs the service entrance conductors. Under the National Electrical Code, the service entrance conductors must be sized to carry the calculated load plus what additional capacity consideration?

A. Service conductors must be sized only for the calculated load with no additional capacity requirement beyond the computed demand
B. Service entrance conductors must be sized to handle the calculated load and must not be smaller than the minimum size required by the NEC for the service rating, ensuring adequate capacity for the installed service equipment
C. Service conductors must be oversized by fifty percent above the calculated load to accommodate future electrical expansion needs
D. Service conductors must be sized to carry twice the calculated load to provide a one-hundred-percent safety factor on all services

6. A contractor discovers during a commercial renovation that the existing building has no accessible route from the parking lot to the main entrance. The renovation triggers ADA accessibility requirements. Under the ADA, when must the contractor install an accessible route?

A. When the renovation affects the building's primary function area and the cost of accessibility modifications does not exceed a disproportionate percentage of the total renovation cost as defined by the applicable regulations
B. Only when the total renovation cost exceeds five hundred thousand dollars for the entire commercial building project scope
C. Only when a person with a disability files a formal complaint with the building department during the renovation permit review
D. Accessibility modifications are required only for new construction and are never triggered by renovation of existing buildings

7. A contractor is managing a commercial project and the structural engineer requires the contractor to install vibration isolation pads beneath all rooftop mechanical equipment. The contractor installs the equipment directly on the structural steel supports without the specified isolation pads. What are the two primary consequences of this omission?

A. The equipment operates at reduced efficiency and the building's fire alarm system generates false alarms from the vibration
B. The equipment warranty is voided and the building's elevator system experiences operational disruptions from the transmitted vibration
C. The rooftop equipment shifts position during high winds and the structural steel supports corrode from the direct metal contact
D. Mechanical vibration transmits through the structure causing occupant discomfort and noise complaints, and the omission fails to meet the specification requirements

8. Under Oregon law, a contractor who performs construction work without a valid CCB license may face criminal prosecution in addition to civil penalties. What level of criminal offense can unlicensed contracting constitute in Oregon?

A. A federal misdemeanor prosecuted by the United States Attorney's office under the Interstate Commerce Act provisions
B. An infraction equivalent to a traffic violation that carries only a fine with no possibility of incarceration for the offender
C. A misdemeanor criminal offense under Oregon law that can result in fines and potential incarceration upon conviction

D. A felony offense that carries a mandatory minimum sentence of one year in state prison upon the first conviction

9. A contractor is building a residential addition and the plans show a beam-to-column connection using a manufactured steel connector. The connector requires specific fasteners including structural bolts and structural screws as shown in the manufacturer's installation instructions. The contractor substitutes standard drywall screws for the specified structural screws. What is the consequence of this fastener substitution?

A. Drywall screws have significantly lower shear and tensile strength than structural screws, and this substitution creates a connection that may fail under design loads because the fasteners cannot transfer the required forces
B. Drywall screws are acceptable substitutes for structural screws in all residential wood-framing connection applications
C. The substitution is acceptable if the contractor installs twice as many drywall screws as the number of structural screws specified
D. Drywall screws have equivalent strength to structural screws and the substitution has no impact on the connection capacity

10. A contractor is managing a commercial project and the owner requests that the contractor provide a project organizational chart showing the key personnel assigned to the project. What is the primary purpose of the organizational chart?

A. To identify the chain of command, communication pathways, and decision-making authority for the project team, ensuring all parties understand their roles, responsibilities, and reporting relationships
B. To calculate the total payroll cost for the project by listing each person's hourly rate next to their name on the chart
C. To satisfy OSHA's requirement that all construction projects exceeding one million dollars have a documented management structure
D. To provide the building inspector with a list of authorized personnel who may request inspections on behalf of the contractor

11. A contractor is performing a commercial renovation and discovers that the existing concrete floor slab has significant efflorescence on the surface. The specifications require a polished concrete floor finish. What does the efflorescence indicate about the concrete slab?

A. The concrete was placed with an improper water-to-cement ratio that reduced the compressive strength below the design requirement

B. The concrete slab has exceeded its useful life and must be demolished and replaced before any new floor finish can be applied
C. The efflorescence is a decorative feature that enhances the appearance of polished concrete and should be preserved during finishing
D. Moisture is migrating through the slab and dissolving soluble salts that deposit as white crystalline residue on the surface, indicating a moisture condition that must be addressed before applying the polished finish

12. A contractor is building a residential home and the structural plans require a steel post to support a beam in the basement. The plans specify the post to bear on a concrete pedestal that distributes the load to the footing below. The contractor sets the steel post directly on the basement floor slab without the specified pedestal. What structural concern does this create?

A. The floor slab is designed to support the post load and the pedestal is an optional component included only for elevation adjustment
B. The steel post corrodes faster when in contact with the floor slab than when bearing on a raised concrete pedestal above the floor
C. The basement floor slab is typically not designed to carry concentrated structural loads, and the post may punch through or crack the slab without a properly designed pedestal and footing beneath it
D. The post functions identically on the slab or on the pedestal because the concrete transmits the load to the soil in both cases

13. A contractor is reviewing a commercial project's quality assurance requirements and discovers that the specifications require the contractor to maintain a non-conformance log. What is the purpose of this log?

A. To record all material purchases that exceed the project budget to track cost overruns caused by quality-related change orders
B. To document the names of workers who fail to pass their annual certification exams for quality control inspection duties
C. To document all instances where work or materials do not conform to the specification requirements, including the corrective action taken and verification that the deficiency was resolved
D. To record the building inspector's comments from each site visit regardless of whether the inspection resulted in a pass or fail

14. A contractor is building a commercial structure and the fire protection engineer requires the installation of a fire alarm system with voice evacuation capability. How does a voice evacuation system differ from a standard horn and strobe fire alarm notification system?

A. Voice evacuation systems use flashing strobe lights in different colors to indicate the type of emergency and the appropriate response
B. Voice evacuation systems are quieter than standard horn systems and are used only in hospitals and libraries where noise must be minimized
C. Voice evacuation systems provide the same notification as standard systems but include a built-in public address for post-emergency use
D. Voice evacuation systems provide recorded or live voice instructions directing occupants on specific actions to take during an emergency, rather than relying solely on audible tones and visual signals

15. A contractor is managing a residential project and the homeowner provides materials purchased directly from a retail store for the contractor to install. The materials are damaged during installation by the contractor's crew. Who bears the cost of replacing the damaged materials?

A. The homeowner bears the cost because the homeowner purchased the materials and assumed all risk of loss upon taking possession
B. The contractor bears the cost of replacing the owner-furnished materials because the contractor's crew caused the damage through their negligent handling during the installation process
C. The material cost is split equally between the contractor and the homeowner because both parties contributed to the installation
D. The retail store bears the cost under the product warranty because the materials were defective and failed during normal installation

16. A contractor is installing a commercial rooftop solar photovoltaic system. The building code requires a rapid shutdown system for the solar array. What is the purpose of the rapid shutdown requirement?

A. To automatically disconnect the solar panels during nighttime hours to prevent reverse current flow through the inverter system
B. To allow the building owner to manually disconnect individual panels for cleaning and routine maintenance procedures
C. To reduce the voltage on conductors within the building and on the roof to safe levels within a specified time, protecting firefighters from electrical shock hazards during rooftop firefighting operations
D. To prevent the solar panels from overheating during peak summer conditions by disconnecting underperforming panel strings

17. A contractor is building a residential home and the plans call for a crawl space foundation. The building code requires a vapor barrier on the crawl space floor. The contractor installs a vapor barrier but does not extend it up the interior face of the foundation walls. Under most building codes, is this installation complete?

A. A properly installed crawl space vapor barrier should extend up the foundation walls and be sealed at the overlap, though specific requirements vary by code edition and jurisdiction
B. The vapor barrier is only required on the floor and never extends up the foundation walls under any building code edition
C. The vapor barrier must cover only fifty percent of the crawl space floor area and is not required on the foundation walls
D. The vapor barrier is required only in climate zones with annual rainfall exceeding forty inches and is optional in drier regions

18. Under Oregon law, a contractor operating as an LLC wants to add a new member to the company. The new member will actively participate in construction work. What CCB-related steps must be taken?

A. The contractor must notify the CCB of the ownership change, and the new member who performs construction work must meet the applicable requirements, which may include workers' compensation coverage considerations
B. No notification to the CCB is required because adding members to an LLC is an internal business matter with no regulatory impact
C. The CCB must approve the new member through a background check before the ownership change can take effect legally
D. The contractor must surrender the existing license and apply for a new CCB license in the name of the reconstituted LLC entity

19. A contractor is managing a commercial project and the concrete subcontractor uses a pump truck to place concrete in elevated forms. During pumping, the concrete pump line ruptures and concrete spills onto a parked vehicle belonging to a visitor. Whose insurance covers the damage to the visitor's vehicle?

A. The visitor's personal auto insurance is the primary coverage because the vehicle was parked on a construction site at the owner's risk
B. The concrete subcontractor's commercial general liability insurance provides primary coverage because the damage resulted from the subcontractor's equipment failure during their pumping operations
C. The building owner's property insurance covers all damage to vehicles parked on the owner's property during the construction period
D. The pump truck rental company's equipment insurance covers damage caused by mechanical failures of their rented equipment

20. A contractor is estimating a residential roofing project. The roof has a total area of thirty-two squares. The roofing material costs eighty-nine dollars per square for three-tab asphalt shingles, including underlayment and nails. The labor cost is sixty-five dollars per square for installation. The contractor applies a fifteen percent markup for overhead and profit. What is the contractor's total bid price for this roofing project?

A. Three thousand four hundred sixty-two dollars based on the material cost only with the fifteen percent markup applied to materials
B. Four thousand nine hundred twenty-eight dollars based on material and labor without the overhead and profit markup applied
C. Five thousand six hundred sixty-seven dollars based on the combined material and labor cost plus the fifteen percent markup
D. Six thousand two hundred forty dollars based on the combined costs plus a twenty percent markup instead of the specified fifteen

21. A contractor is building a commercial structure and the specifications require the contractor to submit a schedule of submittals at the beginning of the project. What information does a schedule of submittals provide?

A. A list of all finished materials with their anticipated delivery dates organized by specification section for the owner's review
B. A summary of the project's financial commitments organized by subcontractor and material supplier for the lender's records
C. A comprehensive listing of all required submittals including shop drawings, product data, samples, and test reports, with planned submission and required review dates coordinated with the construction schedule
D. A list of all building permits and inspection dates organized chronologically for the building department's planning purposes

22. A contractor is performing a residential renovation and the homeowner asks whether the existing aluminum wiring in the house is safe. The home was built in nineteen seventy-two and uses aluminum branch circuit wiring for the receptacles and lighting. What is the primary safety concern with aluminum branch circuit wiring?

A. Aluminum wiring has lower electrical conductivity than copper, which reduces the available amperage at each receptacle outlet
B. Aluminum wiring produces excessive electromagnetic interference that disrupts sensitive electronic equipment in the home

C. Aluminum wiring generates more heat than copper wiring during normal use, which accelerates the degradation of wire insulation
D. Aluminum wiring expands and contracts more than copper during heating and cooling cycles, causing connections to loosen over time, creating high-resistance points that can overheat and cause fires

23. A contractor is managing a commercial project and the mechanical subcontractor submits a request for information asking whether the chilled water piping should be insulated with closed-cell or open-cell insulation. The specifications state closed-cell insulation for all chilled water piping. Why is closed-cell insulation specified for chilled water applications?

A. Closed-cell insulation provides superior fire resistance compared to open-cell insulation in all commercial piping applications
B. Closed-cell insulation resists moisture absorption and prevents condensation on the pipe surface, while open-cell insulation absorbs moisture, loses its insulating value, and promotes mold growth on chilled water piping
C. Closed-cell insulation is less expensive than open-cell insulation and is specified purely for budget reasons on commercial projects
D. Closed-cell insulation provides better sound attenuation for the water flow noise inside the chilled water piping throughout the system

24. Under Oregon law, a contractor is hired to build a detached accessory dwelling unit on a residential property. The contractor must comply with Oregon's ADU regulations. Which of the following is a key requirement for ADU construction in many Oregon jurisdictions?

A. The ADU must comply with all applicable building codes including the Oregon Residential Specialty Code and must meet local zoning requirements for setbacks, height, and floor area
B. ADUs are exempt from all building codes and zoning regulations because Oregon law encourages their construction statewide
C. ADUs may only be built on lots larger than one acre and must be located at least fifty feet from the primary dwelling structure
D. The contractor must obtain a special ADU license from the CCB that is separate from the standard residential contractor license

25. A contractor is building a commercial office building and the specifications require the contractor to install a building commissioning agent's test instruments during construction. The commissioning agent will use these instruments to verify system performance during the commissioning process. What is the role of the commissioning agent on this project?

A. The commissioning agent independently verifies that all building systems are installed, calibrated, and operating per the design intent by performing functional performance testing during and after construction
B. The commissioning agent replaces the building inspector and performs all code compliance inspections on behalf of the local jurisdiction
C. The commissioning agent serves as the general contractor's quality control representative and reports directly to the contractor
D. The commissioning agent designs the building's mechanical and electrical systems and supervises their installation during construction

26. A contractor is building a residential home and discovers that the lot has a steep slope exceeding thirty percent grade. The geotechnical engineer recommends a deep foundation system with concrete piers extending to stable soil. The homeowner asks why conventional shallow footings are not appropriate for this site. What is the correct explanation?

A. Shallow footings are prohibited on all lots with any measurable slope regardless of the soil conditions or engineering analysis
B. Shallow footings are acceptable on steep slopes if the contractor increases the footing width by fifty percent above the standard size
C. Conventional footings are adequate on steep slopes because the footing depth compensates for the reduced bearing capacity of sloped terrain
D. On steep slopes, shallow soil layers may be unstable and subject to creep or sliding, and conventional footings do not reach the stable bearing strata needed to prevent foundation movement

27. A contractor is managing a commercial project and the owner's lender requires the contractor to sign a dual obligee rider on the performance bond. What does a dual obligee rider provide?

A. It allows the contractor to assign the bond to another contractor if the original contractor decides to terminate the contract early
B. It extends the performance bond protection to the lender in addition to the project owner, giving the lender standing to make a claim against the bond if the contractor defaults
C. It doubles the face amount of the performance bond to provide additional financial protection for the project owner exclusively
D. It requires the surety to provide two separate performance bonds, one for the owner and one for the lender on the same project

28. A contractor is installing a commercial kitchen exhaust hood system. The hood manufacturer specifies a minimum exhaust rate in cubic feet per minute based on the hood

type, cooking equipment, and menu. The contractor installs a fan with a lower CFM rating than specified. What operational problem does this create?

A. The undersized fan cannot adequately capture and exhaust grease-laden cooking vapors, causing smoke and grease to escape into the kitchen, creating poor air quality, fire hazards, and potential health code violations
B. The lower CFM fan operates more quietly and is preferred by kitchen staff because it reduces background noise during service
C. The undersized fan provides adequate exhaust but increases the makeup air requirement beyond the capacity of the building system
D. The fan CFM rating has no impact on hood performance because the hood geometry determines the capture effectiveness alone

29. A contractor is reviewing a residential project's structural plans and finds that the engineer has specified a minimum concrete compressive strength of three thousand psi for the foundation walls and four thousand psi for the garage slab. Both elements will be poured on the same day. What quality control measure is most critical during this dual-pour operation?

A. Testing the concrete temperature for both loads to verify they are within the acceptable range for same-day placement and curing
B. Verifying each concrete delivery against the batch ticket to confirm the correct mix design is placed in each element, preventing the lower-strength mix from being placed in the garage slab
C. Measuring the slump of both loads simultaneously to verify that the concrete workability is identical for both the walls and slab
D. Checking the aggregate size in both loads to confirm the maximum aggregate diameter matches the rebar spacing in both elements

30. A contractor is building a commercial structure and the plans require a concrete masonry unit wall to be reinforced with vertical rebar grouted in the cells at specified intervals. The contractor fills the cells with grout but does not consolidate the grout using mechanical vibration. What is the consequence of unconsolidated grout in the CMU wall?

A. Unconsolidated grout has higher compressive strength because the entrapped air voids reduce the grout's weight without affecting capacity
B. The unconsolidated grout affects only the wall's appearance and has no impact on the structural capacity or reinforcement bond
C. Unconsolidated grout may contain voids and air pockets that prevent full contact between the grout and the reinforcement, reducing the bond strength and compromising the wall's structural capacity
D. The building inspector cannot detect unconsolidated grout during inspection and the deficiency will never be identified post-construction

31. A contractor is performing a pre-bid site visit for a commercial demolition project. The contractor observes that the building to be demolished is adjacent to an occupied school. What special consideration must the contractor include in the demolition plan?

A. The contractor must schedule all demolition work during summer break when the school is not in session regardless of the project timeline
B. The contractor must obtain permission from each parent of every student attending the school before beginning any demolition work
C. The contractor must provide the school with complimentary earplugs for all students and staff during the demolition work activities
D. The contractor must address dust control, noise mitigation, vibration limits, traffic management, and safety barriers to protect the adjacent school occupants and ensure compliance with applicable regulations

32. Under Oregon employment law, an employer must pay overtime to non-exempt construction workers. A contractor's employee works forty-four hours during a single workweek at a regular rate of thirty-five dollars per hour. What is the employee's gross pay for the week?

A. One thousand six hundred ten dollars, calculated as forty hours at thirty-five dollars plus four hours at fifty-two dollars and fifty cents
B. One thousand five hundred forty dollars, calculated as forty-four hours at the regular rate of thirty-five dollars per hour
C. One thousand seven hundred fifty dollars, calculated as fifty hours at thirty-five dollars per hour using a rounded work week
D. One thousand four hundred dollars, calculated as forty hours at thirty-five dollars with no overtime premium paid to the employee

33. A contractor is building a residential home and the plans call for an engineered wood I-joist floor system. The I-joist manufacturer's installation guide prohibits cutting, notching, or drilling holes in the flanges of the I-joists. The contractor's plumber cuts a two-inch hole through the bottom flange of an I-joist to route a drain pipe. What structural consequence does this create?

A. The hole in the bottom flange severs the tension member of the I-joist, which can cause the joist to fail under load because the flanges carry the primary bending stresses
B. The hole in the bottom flange has no structural impact because the web carries all of the bending stress in an I-joist design

C. The hole is acceptable as long as it is centered on the flange width and the contractor installs a metal reinforcement plate over the hole
D. The plumber may cut holes in the flanges if the hole diameter does not exceed one-third of the flange width at the penetration point

34. A contractor is managing a commercial project and the specifications require the contractor to maintain a submittal log throughout the project. What is the primary function of a submittal log?

A. To track the contractor's progress payment applications and the owner's payment response time for each monthly billing cycle
B. To record the daily attendance of all workers on the project site for payroll verification and OSHA reporting requirements
C. To document the building inspector's comments and correction notices for each inspection conducted during construction
D. To track the status of all submittals including submission dates, review periods, approval status, and resubmission requirements, ensuring timely processing that does not delay construction

35. A contractor is installing a residential gas fireplace and the manufacturer requires a direct vent termination through the exterior wall. The termination must maintain specific clearances from windows, doors, and other openings. The contractor installs the vent termination twelve inches below an operable bedroom window. The manufacturer requires a minimum thirty-six-inch clearance from operable windows. What is the safety concern?

A. The proximity to the window has no safety impact because direct vent fireplaces exhaust clean combustion gases at low temperatures
B. The close termination affects only the fireplace's heating efficiency and does not create a safety hazard for building occupants
C. Combustion exhaust gases from the fireplace vent can enter the bedroom through the operable window, creating a carbon monoxide exposure hazard for the occupants
D. The vent termination clearance requirement applies only to gas furnaces and not to gas fireplace installations in residential settings

36. A contractor is building a commercial cold storage facility and the insulated metal panel walls require a continuous vapor barrier on the warm side. The contractor installs the panels but fails to seal the joints between panels with the specified vapor barrier tape and sealant. What is the consequence of this omission?

A. The panels provide adequate vapor resistance at the joints without additional sealing because the metal faces create a natural barrier
B. Moisture-laden warm air penetrates through the unsealed joints, condenses on the cold interior surfaces, and freezes within the panel cavity, degrading the insulation and eventually causing panel delamination and structural damage
C. The unsealed joints affect only the facility's fire rating and do not impact the thermal or moisture performance of the wall assembly
D. The unsealed joints improve the wall's air exchange rate, which is beneficial for maintaining air quality inside the cold storage space

37. A contractor is performing a commercial building envelope assessment and discovers that the exterior curtain wall system has failed sealant joints at multiple floor lines. Water testing confirms active leaks at these locations. The contractor submits a repair proposal to the building owner. What repair approach is most appropriate for failed curtain wall sealant joints?

A. Apply a new bead of sealant over the existing failed sealant without removing the old material to create a double-sealed joint
B. Install weep holes at the base of each curtain wall panel to drain the water that enters through the failed joints as designed drainage
C. Replace the failed glass panels adjacent to the leaking joints because the water damage has compromised the glazing seals
D. Remove all failed sealant completely, prepare the joint surfaces per the sealant manufacturer's requirements, install backer rod where required, and apply new sealant to achieve a proper bond to both joint surfaces

38. A contractor is managing a residential project and the building inspector requires a special inspection of the engineered wood connections. The inspector notes that the plans require a registered design professional to perform the special inspection. Under Oregon building codes, who pays for special inspections?

A. The building department pays for special inspections because inspections are a government service funded by permit fees collected
B. The contractor pays for special inspections because they are part of the construction cost included in the contractor's bid price
C. The special inspector pays for their own time as part of their professional development and certification maintenance requirement
D. The owner typically pays for special inspections because the building code assigns the responsibility for obtaining special inspections to the owner, though the cost may be included in the construction contract

39. A contractor is installing commercial ductwork in a ceiling plenum space. The building code classifies the plenum as a return air plenum. What restriction does this classification place on the materials that can be installed within the plenum space?

A. All materials are acceptable in a plenum space as long as they are installed above the ceiling tile grid and below the structural deck
B. Only metal ductwork is restricted in plenum spaces and all other building materials may be installed without any restrictions
C. Materials installed in plenum spaces must have low flame spread and smoke development ratings because the plenum is part of the air distribution system and toxic fumes from burning materials would be distributed throughout the building
D. Plenum spaces are restricted to fire-rated assemblies only and no mechanical or electrical systems may be routed through them

40. Under Oregon law, a contractor completes a residential project and the homeowner refuses to make the final payment claiming that the work is defective. The contractor disagrees and believes the work meets the contract specifications. Before filing a construction lien, what step should the contractor take?

A. File the lien immediately because any delay in filing could result in missing the statutory filing deadline and losing lien rights
B. Attempt to resolve the dispute directly with the homeowner through discussion and documentation, and if unsuccessful, send a written demand for payment before filing the lien
C. File a CCB complaint against the homeowner for nonpayment because the CCB has jurisdiction over payment disputes on all projects
D. Hire an attorney to file a lawsuit in circuit court because construction liens are not available for payment disputes on residential work

41. A contractor is managing a commercial project and the steel erector is installing structural steel beams. The beams are specified to be cambered, meaning they have a slight upward curve built into the beam during fabrication. What is the purpose of cambering structural steel beams?

A. Cambering strengthens the beam by increasing the cross-sectional area at the midspan where bending stresses are the highest
B. The upward camber compensates for the anticipated downward deflection under load so that the beam appears level when fully loaded
C. Cambering reduces the beam's weight by removing material from the bottom flange while maintaining the same overall beam depth
D. Cambering prevents lateral torsional buckling by creating a pre-stressed condition in the beam before the construction loads are applied

42. A contractor is installing a residential water heater in a garage. The building code requires the water heater to be elevated so that the ignition source is at least eighteen inches above the garage floor. What is the reason for this elevation requirement?

A. The elevation prevents pets from accessing the water heater controls and accidentally changing the temperature setting
B. The elevation provides maintenance clearance for the plumber to access the drain valve and anode rod beneath the water heater
C. Flammable vapors from gasoline, solvents, and other volatile materials stored in the garage are heavier than air and collect near the floor, and the elevated ignition source reduces the risk of vapor ignition
D. The elevation protects the water heater from damage if the garage floods during heavy rainstorms common in the Pacific Northwest

43. A contractor is reviewing a commercial project's geotechnical report and the engineer recommends the use of geotextile fabric beneath the building's foundation drainage system. What is the primary function of the geotextile fabric in this application?

A. To provide additional waterproofing protection for the foundation walls beyond the applied membrane waterproofing system
B. To serve as a root barrier that prevents landscaping plant roots from growing into the foundation drainage piping system
C. To increase the bearing capacity of the soil beneath the foundation by distributing the building loads over a larger soil area
D. To separate the drainage aggregate from the surrounding soil, preventing fine soil particles from migrating into the aggregate and clogging the drainage system while allowing water to pass through

44. A contractor is building a commercial structure and the specifications require a vapor retarder beneath the concrete slab on grade. The contractor installs the vapor retarder but punctures it in numerous locations while placing the reinforcement and walking on the surface before the concrete pour. What should the contractor do before pouring?

A. Proceed with the pour because the concrete will seal the punctures as it flows over and around the damaged vapor retarder areas
B. Replace the entire vapor retarder with a new sheet because the punctured barrier provides no moisture protection for the slab
C. Repair all punctures with compatible vapor retarder tape before the concrete pour to maintain the integrity of the moisture barrier
D. Add a liquid-applied vapor retarder on top of the punctured sheet to create a redundant moisture barrier system beneath the slab

45. A contractor is performing a residential renovation and discovers that the existing home has polybutylene water supply piping. The homeowner is unaware of any problems with the plumbing system. What should the contractor advise the homeowner?

A. Polybutylene piping is superior to modern plumbing materials and the homeowner should not consider replacing it under any circumstances
B. Polybutylene piping is identical in performance to copper and PEX piping and requires no special attention or future monitoring
C. Polybutylene piping has a well-documented history of premature failure at fittings and connections, and the homeowner should be informed of this known issue and advised to consider evaluation and potential replacement
D. Polybutylene piping is only a concern in commercial buildings and performs reliably in all residential plumbing system applications

46. A contractor is managing a commercial project and the owner changes the building's intended occupancy from office space to a restaurant during the design phase. This occupancy change affects multiple building systems. Which of the following systems is most significantly impacted by the change from office to restaurant occupancy?

A. The structural frame design is most impacted because restaurant occupancy requires significantly heavier floor load ratings
B. The exterior cladding system is most impacted because restaurants require additional insulation for kitchen heat containment
C. The elevator system is most impacted because restaurants require larger elevators to accommodate food service cart deliveries
D. The plumbing, mechanical ventilation, and fire protection systems are most significantly impacted because restaurants require grease interceptors, commercial kitchen exhaust, increased water supply, and potentially different sprinkler hazard classification

47. A contractor is building a residential home and the energy code requires all recessed light fixtures installed in the insulated ceiling to be rated for insulation contact. The contractor installs standard non-IC-rated recessed fixtures and builds insulation dams around each fixture to maintain the required clearance. Is this installation method acceptable?

A. Yes, because the insulation dams provide the same thermal performance as IC-rated fixtures at a lower installation cost
B. Yes, because the National Electrical Code allows non-IC-rated fixtures in insulated ceilings when three-inch clearance dams are built

C. No, because non-IC-rated fixtures with insulation dams create thermal gaps in the insulation layer that increase energy loss, and current energy codes typically require IC-rated air-tight fixtures that allow insulation to be installed directly over and around the fixture housing
D. No, but only because the insulation dams create a fire hazard when the fixture is operated for more than four consecutive hours

48. Under Oregon law, a homeowner hires a contractor to build a fence around the residential property. The fence will be six feet tall and located on the property line. Before building the fence, what should the contractor verify?

A. The contractor must verify only that the fence materials comply with the CCB's approved materials list for residential fencing work
B. The contractor should verify the property line location through a survey or existing survey markers, check local zoning requirements for fence height and setback regulations, and determine whether a building permit is required
C. The contractor needs only to obtain verbal confirmation from the neighbor that the fence location is acceptable before starting work
D. The contractor must file a fence permit application with the CCB and wait for approval before beginning any fence construction

49. A contractor is managing a commercial project and the specifications require the contractor to conduct a pre-installation conference for the roofing system before the roofing subcontractor begins work. Who should attend this conference?

A. Only the roofing subcontractor's foreman and the contractor's project manager need to attend the pre-installation conference
B. Only the architect and the building inspector need to attend because they are responsible for approving the roofing installation
C. The contractor, roofing subcontractor, architect, roofing manufacturer's representative, and any other relevant parties should attend to review the installation procedures, quality requirements, and warranty conditions
D. Only the building owner and the insurance company representative need to attend to verify the roofing warranty coverage terms

50. A contractor is building a residential addition and the structural plans show a moment frame connection at a beam-to-column joint. The connection requires full-penetration groove welds performed by a certified welder. The contractor's crew makes the welds using a non-certified welder. The building inspector requires proof of welder certification. What must the contractor do?

A. Provide the inspector with the welder's employment history as evidence of equivalent qualification to avoid any retesting process
B. Have the welds inspected and tested by a qualified testing agency, and if any welds fail, remove and replace them using a certified welder, then provide the inspector with the certified welder's credentials
C. Request a variance from the building department accepting the non-certified welder's work based on the visual quality of the welds
D. Submit photos of the completed welds to the building inspector for a visual assessment to confirm the welds are structurally adequate

51. A contractor is estimating a commercial project and needs to calculate the cost of painting the interior walls of a large open office space. The total wall area is twelve thousand square feet. The painter estimates two coats of paint at a coverage rate of three hundred fifty square feet per gallon per coat. Paint costs thirty-two dollars per gallon. The labor rate for painting is one dollar and seventy-five cents per square foot for two coats. What is the total estimated cost for materials and labor?

A. Twenty-three thousand one hundred ninety-four dollars based on the material cost for the calculated number of gallons plus the labor cost at the specified rate for the total wall area
B. Twenty-one thousand dollars based on the labor cost only without including the paint material cost in the total estimate calculation
C. Twenty-five thousand dollars based on a flat rate of two dollars per square foot applied to the total wall area for combined costs
D. Eighteen thousand dollars based on the material cost only without including the labor cost in the total estimate for the project

52. A contractor is performing a commercial renovation and the architect issues a supplemental instruction directing the contractor to change the floor tile color in the main lobby from the originally specified gray to a custom blue. The custom blue tile costs forty percent more than the original gray tile and requires a longer lead time. Under standard contract terms, what is the contractor's right?

A. The contractor must absorb the cost difference because supplemental instructions are binding directives that cannot be disputed
B. The contractor is entitled to a change order covering the cost difference between the specified and substituted tile, plus any additional costs for the extended lead time and schedule impact
C. The contractor may refuse to install the custom tile because supplemental instructions cannot change the material specifications
D. The contractor may charge the architect directly for the cost difference because the architect initiated the change unilaterally

53. A contractor is building a commercial structure and the plans require a structurally connected canopy over the main entrance. The canopy is supported by steel brackets anchored to the concrete wall above the entrance. After installation, the canopy shows visible deflection at the tip. The structural engineer inspects and determines the bracket anchors are undersized. What must the contractor do?

A. Add caulk around the bracket anchors to prevent water infiltration but take no structural corrective action on the installed canopy
B. Install decorative trim beneath the deflected canopy edge to visually conceal the deflection from building occupants and visitors
C. Remove the undersized anchors and install properly sized anchors per the structural engineer's revised design to correct the deflection and ensure the canopy meets the structural requirements
D. Add a support column beneath the canopy tip to eliminate the deflection without addressing the undersized bracket anchors

54. Under Oregon law, a contractor is required to include the CCB license number in all contracts, advertising, and correspondence. A contractor's employee sends an email to a potential client describing the company's services and qualifications but does not include the CCB license number in the email. Is this a violation?

A. Yes, business correspondence describing services is a form of advertising and must include the CCB license number as required by Oregon law
B. Internal emails between company employees are the only correspondence exempt from the CCB license number requirement
C. No, because email correspondence is exempt from the CCB license number requirement under Oregon's digital communication laws
D. No, because the license number is only required on formal printed contracts and not on electronic business communications

55. A contractor is building a commercial parking garage and the specifications require the application of a traffic-bearing waterproof membrane on the elevated concrete decks. The membrane protects the concrete and reinforcement from chloride intrusion and water penetration. The contractor applies the membrane but does not install the specified wearing surface over the membrane. What is the consequence?

A. The membrane provides adequate protection and durability without a wearing surface in all parking garage traffic applications

B. The unprotected membrane will be damaged by vehicle tire traffic, abrasion, and turning movements, causing premature failure of the waterproofing system and exposing the concrete deck to chloride and moisture penetration
C. The wearing surface is a cosmetic feature that improves the parking garage's appearance but has no protective function for the membrane
D. The membrane manufacturer's warranty remains valid regardless of whether the specified wearing surface is installed over the membrane

56. A contractor is managing a residential project and the building inspector requires verification that the windows installed in the home meet the energy code requirements. Each window has a label showing its performance ratings. What rating on the window label verifies compliance with the energy code's thermal performance requirement?

A. The visible transmittance rating, which measures the amount of visible light that passes through the glass for daylighting purposes
B. The U-factor rating, which measures the rate of heat transfer through the window assembly, with lower values indicating better thermal insulation performance
C. The air leakage rating, which measures the volume of air that passes through the window frame joints under test pressure conditions
D. The condensation resistance rating, which measures the window's ability to resist interior moisture buildup during cold weather periods

57. A contractor is building a commercial building and the specifications require the installation of expansion joints in the brick veneer at intervals specified by the architect. The expansion joints allow the brick to expand and contract with temperature and moisture changes. The contractor installs the expansion joints but fills them with mortar instead of the specified flexible sealant. What is the consequence?

A. Mortar-filled expansion joints provide better weatherproofing than sealant-filled joints because mortar creates a more rigid seal
B. The mortar filling has no impact because expansion joints function identically regardless of the fill material used in the joint
C. Mortar-filled joints cannot accommodate the thermal and moisture expansion of the brick veneer, defeating the purpose of the expansion joint and causing the adjacent brickwork to crack as the veneer expands against the rigid mortar
D. The mortar filling accelerates the curing of the adjacent brick mortar joints but has no impact on the expansion joint function

58. A contractor is reviewing a commercial project's insurance requirements and the owner requires the contractor to maintain pollution liability insurance for the project. Under what circumstances would pollution liability insurance be most important?

A. On all projects regardless of scope because standard general liability policies provide no coverage for any environmental claims
B. On projects involving potential exposure to hazardous materials such as asbestos remediation, underground storage tank removal, or work on contaminated sites where pollutant release could cause environmental damage and third-party claims
C. Only on projects located within one thousand feet of a public water supply or wetland area as determined by the county assessor
D. Only on projects valued at more than ten million dollars because smaller projects are exempt from environmental liability concerns

59. A contractor is building a residential home and the plans call for a sealed, conditioned crawl space. Unlike a ventilated crawl space, a conditioned crawl space does not have exterior ventilation openings. How is moisture managed in a sealed conditioned crawl space?

A. Moisture is managed by supplying conditioned air from the HVAC system to the crawl space, installing a complete vapor barrier on the floor and walls, and sealing all air leakage paths to prevent uncontrolled moisture entry
B. Moisture is managed by installing a dehumidifier as the sole method of moisture control without any vapor barrier or HVAC connection
C. Moisture is not a concern in sealed crawl spaces because the lack of ventilation openings prevents all moisture from entering the space
D. Moisture is managed by flooding the crawl space with gravel to a depth of twelve inches, which absorbs all groundwater infiltration

60. A contractor is estimating a commercial project and must account for escalation in material costs over the projected eighteen-month construction period. Based on industry forecasts, the contractor estimates a five percent annual escalation rate for structural steel. The initial steel cost estimate is six hundred thousand dollars. What is the estimated escalated steel cost at the midpoint of the project?

A. Approximately six hundred fifteen thousand dollars based on applying half of the annual escalation rate to account for the nine-month midpoint of the eighteen-month project duration
B. Six hundred thirty thousand dollars based on applying the full five percent annual escalation rate to the initial steel cost estimate
C. Six hundred thousand dollars because material cost escalation is not included in construction estimates and is the owner's risk
D. Six hundred fifty thousand dollars based on the annual rate plus a five percent contingency for market volatility in the steel industry

61. A contractor is performing a commercial building assessment and discovers that the building's existing fire escape stairway has corroded structural members and does not meet current building code requirements. The building owner wants to renovate the interior spaces but does not want to address the fire escape. Under Oregon building codes, can the building department require the fire escape to be repaired as a condition of the renovation permit?

A. No, because existing fire escapes are grandfathered under the original building code and can never be required to be upgraded
B. No, because fire escape requirements apply only to the building's interior egress components and not to exterior stairways
C. Yes, but only if the renovation cost exceeds seventy-five percent of the building's assessed value as determined by the tax assessor
D. Yes, the building department may require repair or replacement of existing life safety deficiencies including fire escapes as a condition of issuing a renovation permit, particularly when the deficiencies pose an imminent hazard

62. Under Oregon law, a contractor builds a speculative residential home for sale. Before the home is sold, the contractor discovers a plumbing defect that causes intermittent leaking under the kitchen sink. The contractor repairs the visible leak but does not address the root cause, which is a defective fitting that will eventually fail again. The contractor sells the home without disclosing the underlying plumbing issue. What legal liability does the contractor face?

A. The contractor faces potential liability for failure to disclose a known material defect, which may constitute fraud or a violation of Oregon's property disclosure requirements
B. No liability exists because the contractor repaired the visible leak and had no obligation to investigate or disclose the underlying cause
C. Liability is limited to the cost of the replacement fitting because the contractor made a good-faith effort to repair the plumbing issue
D. The contractor is protected from liability because buyers of speculative homes assume all risk for undisclosed conditions as-is

63. A contractor is managing a commercial project and the building envelope consultant requires the contractor to install air barrier testing during construction. The test involves pressurizing the building and measuring the air leakage rate. What is the purpose of this whole-building air leakage test?

A. To measure the HVAC system's capacity to maintain positive pressure in the building for smoke control during a fire emergency

B. To verify the building envelope's air tightness to ensure the design meets the energy code requirements for air infiltration control
C. To test the structural capacity of the building walls to resist wind pressure during storms and hurricane-force weather events
D. To verify that the building envelope can maintain the air tightness required by the specifications, reducing uncontrolled air infiltration that wastes energy, causes moisture problems, and compromises indoor air quality

64. A contractor is building a residential addition and the existing home has a hip roof. The addition will tie into the existing roof. The contractor must install a cricket or saddle at the intersection where the addition's roof meets the existing roof wall. What is the purpose of the cricket?

A. The cricket provides additional structural support at the roof-to-wall intersection where the addition connects to the existing building
B. The cricket diverts water away from the roof-to-wall intersection, preventing water accumulation and potential leaks at the transition between the existing roof and the addition
C. The cricket serves as a ventilation channel that allows air to flow from the addition's attic into the existing home's attic space
D. The cricket is a decorative element that creates a smooth visual transition between the different roof slopes at the intersection

65. A contractor is installing a commercial building's electrical system and the specifications require the contractor to install a separate electrical meter for each tenant space. The building will have six tenant spaces. Under the National Electrical Code, what is the maximum number of service disconnects allowed at a single service location?

A. Three service disconnects maximum, requiring the contractor to use a main distribution panel for the remaining tenant meters
B. Eight service disconnects maximum, meaning the contractor can install one for each of the six tenants plus two for building common areas
C. One service disconnect maximum, requiring all tenant meters to be fed from a single main service panel with individual breakers
D. Six service disconnects maximum, matching exactly the number of tenant spaces without any additional capacity for common areas

66. A contractor is performing a residential renovation and the homeowner asks the contractor to install a whole-house water filtration system. The system requires a new cold water connection, a drain connection for the backwash cycle, and an electrical connection for the control valve. Under Oregon regulations, which trades are required for this installation?

A. The general contractor may install all components without any specialty trade licenses because the system is classified as an appliance
B. A licensed plumber is required for the water and drain connections, and a licensed electrician is required for the electrical connection, because these are regulated trade activities in Oregon
C. Only a water treatment system manufacturer's representative is authorized to install the entire system under Oregon regulations
D. The homeowner may install the entire system without any licensed trades because homeowner exemptions cover all fixture installations

67. A contractor is managing a commercial project and the structural engineer requires post-installed concrete anchors in the existing concrete walls to attach new steel framing. The specifications require the anchors to be tested per the special inspection requirements. The contractor installs the anchors without special inspection. What is the consequence?

A. The installation passes inspection because post-installed anchors are exempt from special inspection requirements in existing concrete
B. The building inspector approves the anchors if the contractor provides the anchor manufacturer's catalog data as proof of capacity
C. The anchors are accepted without testing if the contractor certifies in writing that the installation followed the manufacturer's instructions
D. The installation does not comply with the building code because special inspection is required to verify that the anchors are properly installed and achieve the required capacity in the existing concrete

68. A contractor is building a residential home and the plans require a sump pump system in the basement. The sump pump discharges water through a pipe to the exterior of the building. Under Oregon plumbing codes, where must the sump pump discharge be directed?

A. The discharge must be directed to an approved location that does not create a nuisance, cause erosion, or discharge onto adjacent properties, and must comply with local stormwater and plumbing code requirements
B. The discharge must be connected to the sanitary sewer system because all below-grade water must be treated before discharge
C. The discharge must be routed to the building's gutter system and discharged through the downspout at the foundation corner
D. The discharge may be directed to any location on the property without restriction because sump pump water is classified as clean

69. A contractor is reviewing a commercial project's specifications and discovers that the specifications require the contractor to provide a construction schedule using the precedence diagramming method with a minimum of five hundred activities. What advantage does a detailed schedule with this many activities provide?

A. A detailed schedule with five hundred activities is primarily a contractual requirement that serves no practical project management purpose
B. The large number of activities increases the project duration by adding administrative overhead that slows down the construction process
C. A detailed schedule allows the contractor to track progress at a granular level, identify potential delays early, allocate resources effectively, and provide accurate schedule updates to the owner
D. The detail level is excessive and all commercial projects can be effectively managed with a simple bar chart showing major milestones only

70. A contractor is building a commercial structure and the fire protection engineer requires a rated smoke barrier at the boundary between two smoke compartments. The contractor installs the smoke barrier wall but does not install smoke dampers in the ductwork that penetrates the barrier. What life safety deficiency does this create?

A. Smoke dampers are optional components that improve energy efficiency but do not affect the smoke barrier's code compliance
B. The missing dampers affect only the HVAC system's air balance and have no impact on smoke containment during a fire event
C. Smoke dampers are required only in hospitals and are not necessary in standard commercial office building smoke barrier walls
D. Without smoke dampers, the ductwork creates unprotected openings that allow smoke to spread between compartments, defeating the purpose of the smoke barrier and endangering occupants in the adjacent compartment

71. A contractor is managing a residential project and the homeowner asks the contractor to explain the purpose of a title search before construction begins. What does a title search reveal that is relevant to a construction project?

A. The title search reveals the home's current market value and determines the maximum amount of the construction loan available
B. The title search identifies the home's energy efficiency rating and determines whether the property qualifies for green building incentives
C. The title search reveals ownership, existing liens, easements, restrictions, and encumbrances on the property that could affect the construction project or the contractor's ability to file a lien
D. The title search identifies the property's zoning classification and determines whether the planned construction complies with local codes

72. A contractor is installing a commercial HVAC system and the mechanical specifications require all refrigerant piping to be pressure tested with dry nitrogen before charging with refrigerant. The contractor charges the system with refrigerant without performing the nitrogen pressure test. What risk does this create?

A. The nitrogen test is an optional manufacturer recommendation and the system operates identically with or without the pre-charge test
B. Charging a system without pressure testing risks introducing refrigerant into a piping system that may have leaks, joints that were not properly brazed, or debris contamination, resulting in refrigerant loss, system damage, and environmental contamination
C. The only consequence is a minor delay in the system reaching operating temperature because the nitrogen must be purged first
D. The untested system operates normally because modern refrigerants are self-sealing and will plug any minor leaks in the piping joints

73. Under Oregon law, a contractor performing residential work must comply with the Oregon Residential Specialty Code for all applicable installations. A homeowner asks the contractor whether the code requires carbon monoxide detectors in the home. Under which circumstance does the Oregon code require carbon monoxide detectors?

A. Carbon monoxide detectors are required only in homes with wood-burning fireplaces and are not required for gas-fired appliances
B. Carbon monoxide detectors are optional in all Oregon residences and are installed only at the homeowner's preference and expense
C. Carbon monoxide detectors are required only in rental properties and are not required in owner-occupied single-family residences
D. Carbon monoxide detectors are required in dwellings with fuel-burning appliances or attached garages, as specified by the applicable code edition

74. A contractor is managing a commercial project and the owner requests that the contractor provide value engineering alternatives for the building's exterior wall system. The original specification calls for a precast concrete panel system. The contractor proposes a metal stud and EIFS exterior wall as an alternative. What factors must be evaluated before the owner can make an informed decision?

A. Only the cost difference between the two systems needs to be evaluated because the owner's primary concern is reducing the budget

B. The cost savings, structural performance, thermal performance, moisture resistance, durability, maintenance requirements, aesthetic impact, and long-term lifecycle costs must be evaluated to ensure the alternative system meets all project requirements
C. Only the construction schedule impact needs to be evaluated because EIFS installation is faster than precast concrete panel erection
D. Only the fire resistance ratings of both systems need to be compared because fire safety is the only criterion for exterior wall selection

75. A contractor is building a residential home and the plans specify a tankless water heater with a recirculation pump system for instant hot water at all fixtures. The contractor installs the tankless water heater but does not install the recirculation system. The homeowner must wait several minutes for hot water at the master bathroom, which is eighty feet from the water heater. What did the contractor fail to provide?

A. The recirculation system specified in the plans, which circulates hot water through a dedicated return line or the cold water line back to the water heater, keeping hot water available near each fixture and eliminating the wait time
B. An adequately sized water heater because the long wait time indicates the tankless unit has insufficient capacity for the home's layout
C. Proper insulation on the hot water supply pipes, which would eliminate the wait time without the need for a recirculation system
D. A second tankless water heater near the master bathroom because a single unit cannot serve fixtures beyond fifty feet of pipe run

76. A contractor is reviewing a commercial project's closeout requirements and the specifications require the contractor to provide operation and maintenance manuals for all installed building systems. What is the primary purpose of these manuals?

A. To provide the building inspector with documentation for the final inspection and certificate of occupancy review process
B. To serve as the contractor's warranty document that defines the terms and duration of the construction warranty coverage
C. To provide the building owner and maintenance staff with the information needed to properly operate, maintain, and service all installed building systems throughout the facility's operational life
D. To document the contractor's installation methods for each building system in case a future contractor needs to replicate the work

77. A contractor is performing a commercial renovation and discovers that the existing building's electrical panel has been previously modified with multiple double-tapped circuit

breakers, where two conductors share a single breaker terminal not rated for multiple conductors. What is the electrical hazard?

A. Double-tapped breakers create a balanced load distribution that improves the panel's overall electrical efficiency and safety
B. Double-tapped breakers are acceptable for circuits under twenty amperes and only create a hazard on circuits exceeding thirty amperes
C. Double-tapped breakers reduce the panel's total ampacity by fifty percent but do not create a fire or electrical shock hazard
D. Double-tapped connections at breaker terminals not rated for multiple conductors can cause loose connections, arcing, overheating, and potential fire, and the condition must be corrected by installing properly rated breakers or adding circuits

78. A contractor is building a residential deck and the homeowner requests a cable railing system instead of the traditional picket-style guardrail specified in the plans. The contractor installs the cable railing with cables spaced at five inches apart. Under the building code, does this spacing meet the guardrail infill requirements?

A. The five-inch cable spacing exceeds the maximum allowable opening because the building code requires guardrail infill to prevent passage of a four-inch sphere
B. Cable railing systems are exempt from the four-inch sphere rule because the cables provide adequate fall protection regardless of spacing
C. The five-inch spacing is acceptable because the building code allows larger openings for cable railing systems specifically
D. The cable spacing requirement varies by jurisdiction and five inches is the national standard for cable railing in residential applications

79. A contractor is managing a commercial project and the specifications require the contractor to provide a one-year warranty on all workmanship. During the warranty period, the building owner reports that several interior doors are sticking and difficult to open. The contractor inspects and determines that normal building settlement has caused the door frames to shift slightly. Is this condition covered under the contractor's warranty?

A. No, because building settlement is a natural occurrence that is specifically excluded from construction workmanship warranties
B. No, because interior doors are classified as finish items that carry only a ninety-day warranty under standard commercial terms
C. Yes, the contractor should adjust or rehang the doors as a warranty item because the warranty covers all conditions that affect the functional performance of the completed work, regardless of the underlying cause
D. Yes, but only if the contractor can prove that the settlement was caused by a defect in the contractor's foundation construction

80. A contractor is building a commercial structure and the plans require the installation of a generator paralleling system that allows multiple generators to operate in synchronization to serve the building's emergency and standby loads. What is the primary advantage of a paralleling system compared to a single large generator?

A. A paralleling system costs less than a single large generator because smaller generators have lower per-kilowatt purchase prices
B. A paralleling system reduces fuel consumption because the generators operate at lower RPM than a single large generator unit
C. A paralleling system eliminates the need for an automatic transfer switch because the generators are permanently connected to loads
D. A paralleling system provides redundancy so that if one generator fails, the remaining generators continue to serve the critical loads, and the system can be scaled to match varying load conditions efficiently

Practice Exam 22: Answer Key and Explanations

1. A — Oregon public contracting law requires both the performance bond and the payment bond to equal one hundred percent of the contract price on public works projects. The performance bond guarantees the contractor will complete the work per the contract terms, while the payment bond guarantees subcontractors and suppliers will be paid. Both bonds at full contract value provide maximum protection for the public agency and the subcontracting community.

2. D — Local noise ordinances establish the allowable hours for construction noise in residential areas and the contractor must comply regardless of the desired work schedule. Starting noisy work before the permitted time violates the ordinance and can result in citations and fines. The contractor should adjust the early morning schedule to perform quiet preparatory tasks and begin noisy activities only after the permitted start time.

3. A — Collecting milestone payments before completing the associated work may violate Oregon's contractor regulations and could constitute a deceptive trade practice. The payment schedule ties payment to completed work milestones, and collecting ahead of completion misrepresents the project's progress. The contractor must complete the work associated with each milestone before collecting the corresponding payment.

4. A — The footing volume is six feet times six feet times two feet, equaling seventy-two cubic feet. Dividing by twenty-seven cubic feet per cubic yard yields approximately two-point-seven cubic yards. This straightforward volume calculation converts cubic feet to the standard unit of measure for ordering ready-mix concrete.

5. B — Service entrance conductors must be sized to handle the calculated electrical load and must not be smaller than the minimum conductor size required by the NEC for the service

rating. For a two-hundred-ampere service, the NEC specifies minimum conductor sizes based on the conductor material and installation conditions. Proper conductor sizing ensures the service can safely carry the full rated load without overheating.

6. A — The ADA requires accessibility modifications when a renovation affects the building's primary function area, such as converting office space or adding a restaurant. The cost of accessibility modifications is generally limited to a disproportionate percentage of the total renovation cost, typically twenty percent. This provision balances accessibility goals with the economic impact on building owners.

7. D — Without vibration isolation pads, mechanical vibration from rooftop equipment transmits directly through the structural steel into the building frame, causing noise and vibration complaints from occupants on the upper floors. The omission also fails to meet the specification requirements, which constitutes a contract compliance issue. Both operational and contractual consequences result from the missing isolation pads.

8. C — Performing construction work without a valid CCB license can constitute a misdemeanor criminal offense under Oregon law. Conviction can result in fines and potential incarceration. This criminal enforcement authority, in addition to civil penalties, demonstrates the seriousness with which Oregon treats unlicensed contracting to protect consumers.

9. A — Drywall screws are designed for attaching gypsum board and have significantly lower shear and tensile strength than structural screws designed for load-bearing connections. Substituting drywall screws in a structural connector creates a connection that cannot transfer the design forces and may fail under load. This is a common but dangerous substitution that compromises structural safety.

10. A — A project organizational chart identifies the chain of command, communication pathways, and decision-making authority for everyone involved in the project. Clear roles and reporting relationships prevent communication breakdowns, ensure timely decisions, and establish accountability. The chart is particularly important on complex commercial projects with multiple stakeholders.

11. D — Efflorescence is caused by moisture migrating through the concrete slab, dissolving soluble salts within the concrete, and depositing them as white crystalline residue on the surface as the moisture evaporates. This indicates an active moisture condition that must be tested and addressed before applying the polished concrete finish. Excessive moisture can cause polishing failures and coating delamination.

12. C — A typical basement floor slab is designed as a non-structural element that resists only soil moisture pressure and light foot traffic, not concentrated structural loads from columns. Placing a steel post directly on the slab without a properly designed pedestal and footing can cause the post to punch through or crack the thin floor slab. The pedestal distributes the concentrated load to a footing designed for the structural loads.

13. C — A non-conformance log documents every instance where work or materials fail to meet the specification requirements, along with the corrective action taken and verification that the deficiency was properly resolved. This systematic documentation ensures that quality issues are tracked to closure and provides a record for audits, inspections, and dispute resolution. The log is a core quality management tool.

14. D — Voice evacuation systems provide recorded or live voice instructions that direct occupants on specific actions to take during an emergency, such as which exits to use and which floors to evacuate. This targeted communication is more effective than simple horn tones because it gives occupants actionable information. Voice systems are required in high-rise buildings and large assembly occupancies.

15. B — When the contractor's crew damages owner-furnished materials through negligent handling during installation, the contractor bears the cost of replacement. The materials were in the contractor's care and custody during the installation process, and the damage resulted from the crew's negligence. The contractor is responsible for exercising reasonable care when handling materials provided by the homeowner.

16. C — The rapid shutdown requirement reduces the voltage on conductors within the building and on the roof to safe levels within a specified time after the system is shut down. This protects firefighters from electrical shock hazards when they cut into the roof for ventilation or walk on the roof surface during firefighting operations. Solar panels generate dangerous voltage whenever exposed to sunlight.

17. A — A properly installed crawl space vapor barrier should extend up the interior face of the foundation walls and be sealed at the overlap to prevent moisture from migrating through the wall-to-floor junction. The specific requirements vary by code edition and jurisdiction, but most codes require the barrier to cover both the floor and the walls to create a continuous moisture barrier. Leaving the walls exposed allows moisture to enter the crawl space.

18. A — Adding a new member who will actively participate in construction work requires notification to the CCB because the ownership change affects the license record. The new member's participation in construction work triggers workers' compensation coverage considerations that must be addressed. The CCB must be informed of ownership changes within the required timeframe.

19. B — The concrete subcontractor's commercial general liability insurance provides primary coverage for property damage caused by the subcontractor's equipment during their operations. The pump line rupture was a failure of the subcontractor's equipment during their work, making the damage a direct result of the subcontractor's operations. The subcontractor's CGL policy responds to this type of third-party property damage claim.

20. C — Material cost is thirty-two squares times eighty-nine dollars per square equaling two thousand eight hundred forty-eight dollars. Labor cost is thirty-two squares times sixty-five dollars per square equaling two thousand eighty dollars. Combined cost is four thousand nine hundred twenty-eight dollars. Adding fifteen percent markup yields five thousand six hundred sixty-seven dollars.

21. C — A schedule of submittals lists all required submittals including shop drawings, product data, material samples, test reports, and certificates, with planned submission dates and required review periods coordinated with the construction schedule. This master tracking document ensures timely processing of submittals so that material procurement and fabrication do not delay construction activities.

22. D — Aluminum wiring expands and contracts at a greater rate than copper during heating and cooling cycles, causing connections at receptacles, switches, and junction boxes to loosen

over time. These loose connections create high-resistance points that generate heat, potentially causing wire insulation to melt and fires to ignite. This thermal cycling issue is the primary safety concern with aluminum branch circuit wiring.

23. B — Closed-cell insulation has a cellular structure that resists moisture absorption, which is critical for chilled water piping where the pipe surface temperature is below the dew point. Open-cell insulation absorbs condensation from the surrounding air, loses its insulating value when wet, and promotes mold growth. Closed-cell insulation maintains its thermal performance and prevents condensation-related problems.

24. A — Accessory dwelling units must comply with all applicable building codes including the Oregon Residential Specialty Code and must meet local zoning requirements for setbacks, height, and floor area limitations. Oregon has enacted legislation encouraging ADU construction by reducing regulatory barriers, but the units must still meet building and safety standards. Local zoning requirements vary by jurisdiction.

25. A — The commissioning agent independently verifies that all building systems are installed correctly, calibrated properly, and operating according to the design intent. Through functional performance testing, the commissioning agent confirms that the systems deliver the energy performance and occupant comfort specified by the engineer. This independent verification is separate from the contractor's quality control and the building inspector's code compliance inspections.

26. D — On steep slopes, the shallow soil layers may be unstable due to erosion, creep, or slide potential, and conventional spread footings placed in these soils may not provide adequate bearing capacity or stability. Deep foundations such as concrete piers extend through the unstable surface soils to reach stable bearing strata, ensuring the foundation is anchored in competent material that can support the building loads without movement.

27. B — A dual obligee rider extends the performance bond protection to include the lender in addition to the project owner, giving both parties standing to make a bond claim if the contractor defaults. This protects the lender's financial interest in the construction project by ensuring the bond proceeds are available to complete the work even if the owner and lender have different priorities during a default situation.

28. A — An undersized exhaust fan cannot generate sufficient airflow to capture and remove grease-laden cooking vapors before they escape the hood canopy. Uncaptured vapors create poor kitchen air quality, deposit grease on surfaces throughout the kitchen creating fire hazards, and may violate health department requirements. The fan must be sized to match the hood's calculated exhaust requirement.

29. B — Verifying each concrete delivery against the batch ticket is the most critical quality control step when different mix designs are being placed on the same day. Placing the three-thousand-psi mix in the garage slab instead of the specified four-thousand-psi mix creates a structural deficiency that is extremely costly to correct after the concrete has cured. Batch ticket verification takes seconds but prevents major quality failures.

30. C — Unconsolidated grout may contain voids, air pockets, and incomplete fill around the reinforcing bars, preventing the full bond between the grout and the reinforcement that is essential for the wall's structural capacity. Mechanical vibration or puddling is required to

ensure the grout completely fills the cell and surrounds the rebar. Voids in the grout reduce the wall's capacity to resist lateral and vertical loads.

31. D — Demolition adjacent to an occupied school requires comprehensive planning for dust control, noise mitigation, vibration monitoring, traffic management, and physical safety barriers. The contractor must protect the school's students and staff from construction hazards including airborne debris, excessive noise, ground vibration, and construction vehicle traffic. Compliance with applicable regulations and coordination with the school administration is essential.

32. A — Forty hours at thirty-five dollars equals one thousand four hundred dollars in regular pay. Four overtime hours at one-and-one-half times thirty-five dollars equals four hours at fifty-two dollars and fifty cents, totaling two hundred ten dollars. The gross pay is one thousand four hundred plus two hundred ten, equaling one thousand six hundred ten dollars.

33. A — The bottom flange of an I-joist carries the primary tensile stress when the joist is loaded. Cutting a hole through the bottom flange severs the tension member, dramatically reducing the joist's load-carrying capacity and creating a potential failure point. Engineered I-joist manufacturers strictly prohibit any cuts, notches, or holes in the flanges because the flanges are the primary structural elements.

34. D — A submittal log tracks the status of every submittal throughout the project, including submission dates, architect review periods, approval status, revision requirements, and resubmission dates. This tracking ensures that submittals are processed on time and do not create delays in material procurement or fabrication. The log provides accountability for both the contractor's submission timing and the architect's review duration.

35. C — Combustion exhaust gases from a direct vent fireplace contain carbon monoxide, and terminating the vent too close to an operable window allows these gases to enter the living space when the window is opened. The manufacturer's clearance requirements exist specifically to prevent exhaust gas re-entry through windows, doors, and other openings. Carbon monoxide is odorless and can cause serious illness or death.

36. B — Unsealed joints between insulated metal panels allow warm, moisture-laden air to penetrate into the panel cavity. In a cold storage facility, this moisture condenses and freezes within the insulation, progressively degrading the thermal performance and eventually causing the panel facings to delaminate from the insulation core. The vapor barrier must be continuous and sealed at every joint to prevent moisture intrusion.

37. D — Proper curtain wall sealant repair requires complete removal of all failed sealant, thorough surface preparation per the sealant manufacturer's requirements, installation of backer rod to control the joint profile, and application of new sealant that bonds properly to both joint surfaces. Applying new sealant over failed material does not achieve proper adhesion and the repair will fail prematurely.

38. D — The building code assigns the responsibility for obtaining special inspections to the building owner, though the cost is often included in the construction contract as a project expense. The owner hires the special inspector, who must be independent of the contractor to ensure objectivity. The specific cost allocation between the owner and contractor depends on the contract terms.

39. C — Materials installed in plenum spaces must have low flame spread and smoke development ratings because the plenum serves as part of the air distribution system. If materials in the plenum catch fire, the toxic smoke and fumes would be distributed throughout the building via the HVAC system. This is why standard combustible materials such as standard PVC conduit and romex wiring are restricted in plenum-rated spaces.

40. B — Before filing a construction lien, the contractor should attempt to resolve the dispute directly with the homeowner through discussion, documentation of the work quality, and a written demand for payment. Direct resolution avoids the cost and time of lien enforcement proceedings. However, the contractor must be mindful of the statutory lien filing deadline and should not delay so long that lien rights are lost.

41. B — Cambering introduces an upward curve into the beam during fabrication that compensates for the anticipated downward deflection when the beam is loaded with dead and live loads. When fully loaded, the cambered beam settles to a level or near-level position, providing a flat ceiling line and preventing visible sag. The camber amount is calculated based on the expected dead load deflection.

42. C — Flammable vapors from gasoline, solvents, paint thinners, and other volatile materials commonly stored in garages are heavier than air and accumulate near the floor. The eighteen-inch elevation requirement keeps the water heater's ignition source above the zone where these dense vapors concentrate, reducing the risk of vapor ignition. This requirement applies to all fuel-fired appliances installed in garages.

43. D — Geotextile fabric separates the drainage aggregate from the surrounding soil, preventing fine soil particles from migrating into the aggregate and clogging the drainage system over time. The fabric allows water to pass through while filtering out the fine particles that would fill the void spaces in the aggregate and reduce its drainage capacity. Without the fabric, the drainage system would eventually fail.

44. C — Punctured areas in the vapor retarder allow moisture to migrate through the damaged sections and into the concrete slab. Repairing all punctures with compatible vapor retarder tape before the pour restores the barrier's integrity at a fraction of the cost of full replacement. The repairs must be made with tape specified for use with the vapor retarder material to ensure compatibility and adhesion.

45. C — Polybutylene piping, widely installed from the late nineteen seventies through the mid-nineteen nineties, has a well-documented history of premature failure particularly at fittings, connections, and where exposed to chlorinated water. The failures typically manifest as pinhole leaks or joint separations that can cause significant water damage. The contractor should inform the homeowner and recommend professional evaluation.

46. D — Changing from office to restaurant occupancy has the most significant impact on the plumbing, mechanical ventilation, and fire protection systems. Restaurants require grease interceptors, commercial kitchen exhaust with makeup air, substantially increased water supply and drainage capacity, and potentially higher sprinkler hazard classifications. The structural, cladding, and elevator systems are less affected by this occupancy change.

47. C — Non-IC-rated fixtures with insulation dams create gaps in the thermal envelope where heat escapes through and around the fixture housing. Current energy codes typically require

IC-rated airtight fixtures that allow insulation to be installed directly over and around the fixture, maintaining continuous thermal insulation across the ceiling plane. The dams sacrifice energy performance and may not comply with the energy code.

48. B — Before building a fence on or near the property line, the contractor should verify the property line location, check local zoning requirements for fence height and setback regulations, determine whether a building permit is required, and confirm compliance with any HOA restrictions. Building a fence in the wrong location or at a non-compliant height can result in required removal and reconstruction.

49. C — A comprehensive pre-installation conference should include the contractor, roofing subcontractor, architect, roofing manufacturer's representative, and other relevant parties. This meeting reviews installation procedures, material handling, quality standards, inspection points, warranty requirements, and safety protocols. The manufacturer's representative ensures the installation will comply with warranty conditions.

50. B — The contractor must have the non-certified welder's work inspected and tested by a qualified testing agency to determine whether the welds meet the structural requirements. Any welds that fail testing must be removed and replaced by a properly certified welder. The certified welder's credentials must be provided to the building inspector to verify compliance with the specification requirement.

51. A — Total paint needed is twelve thousand square feet times two coats divided by three hundred fifty square feet per gallon, equaling approximately sixty-nine gallons. Material cost is sixty-nine gallons times thirty-two dollars equaling two thousand one hundred ninety-four dollars (approximately). Labor cost is twelve thousand square feet times one dollar seventy-five equaling twenty-one thousand dollars. Total is approximately twenty-three thousand one hundred ninety-four dollars.

52. B — A change in material specification from gray to custom blue tile constitutes a design change that increases the project cost. The contractor is entitled to a change order covering the cost difference between the originally specified and the substituted material, plus any costs associated with the longer lead time including potential schedule delays. Supplemental instructions that change materials require equitable cost adjustments.

53. C — Undersized anchors cannot transfer the canopy loads to the concrete wall as designed, causing the visible deflection at the canopy tip. The contractor must remove the undersized anchors and install properly sized anchors per the structural engineer's revised design to eliminate the deflection and ensure the canopy meets structural safety requirements. Cosmetic fixes do not address the underlying structural deficiency.

54. A — Business correspondence describing the contractor's services constitutes advertising under Oregon's CCB regulations, and the CCB license number must be included. This requirement applies to all forms of communication used to promote or describe the contractor's services, including emails, social media posts, and website content. The license number allows potential clients to verify the contractor's credentials.

55. B — The traffic-bearing waterproof membrane is designed to be protected by a wearing surface that absorbs the mechanical abuse from vehicle tires, turning movements, and abrasive debris. Without the wearing surface, direct tire traffic damages the membrane through abrasion,

puncture, and tearing, causing premature waterproofing failure. The exposed concrete deck then suffers chloride penetration and reinforcement corrosion.

56. B — The U-factor measures the rate of heat transfer through the window assembly, with lower values indicating better insulating performance. Energy codes specify maximum U-factor values for windows based on climate zone, and the window label must show the U-factor rating that meets or exceeds the code requirement. The U-factor is the primary metric used to verify window thermal performance for energy code compliance.

57. C — Mortar is a rigid material that cannot accommodate the thermal expansion and contraction movement of brick veneer. When the brick expands against the rigid mortar-filled joint, the expansion forces have no relief and transfer into the adjacent brickwork, causing cracking. Flexible sealant compresses and stretches with the brick movement, absorbing the expansion without transferring stress to the masonry.

58. B — Pollution liability insurance is most important on projects involving potential hazardous material exposure such as asbestos removal, underground storage tank decommissioning, or construction on contaminated sites. Standard CGL policies typically exclude pollution-related claims, leaving the contractor exposed to significant liability if a pollutant release occurs. Pollution liability provides coverage specifically for environmental cleanup costs and third-party claims.

59. A — A sealed conditioned crawl space manages moisture through three primary methods: supplying conditioned air from the HVAC system to maintain temperature and humidity control, installing a complete vapor barrier on the floor and walls to prevent ground moisture from entering the space, and sealing all air leakage paths to prevent uncontrolled moist air from entering. These combined measures keep the crawl space dry without exterior ventilation.

60. A — At the nine-month midpoint of an eighteen-month project, half of the annual escalation rate applies. Five percent annual rate times nine-twelfths of a year equals approximately two-point-five percent escalation at the midpoint. Two-point-five percent of six hundred thousand dollars equals fifteen thousand dollars. The estimated escalated cost at midpoint is approximately six hundred fifteen thousand dollars.

61. D — Building departments have the authority to require correction of existing life safety deficiencies as a condition of issuing a renovation permit, particularly when those deficiencies pose an imminent hazard to building occupants. A corroded fire escape that does not meet current code represents a life safety concern that the building official can require to be addressed. This authority ensures occupant safety during and after renovation.

62. A — A contractor-developer who knows of a material defect and fails to disclose it to the buyer faces potential liability for fraud and violation of Oregon's property disclosure requirements. The contractor's cosmetic repair without addressing the root cause demonstrates knowledge of the ongoing defect. Oregon law requires sellers of residential property to disclose all known material defects to prospective buyers.

63. D — Whole-building air leakage testing verifies the building envelope's air tightness by measuring the rate of air infiltration under controlled pressure. Excessive air leakage wastes energy by allowing conditioned air to escape and unconditioned air to enter, can cause moisture

problems from uncontrolled humid air penetrating wall cavities, and compromises indoor air quality. The test ensures the envelope meets the design performance standards.

64. B — A cricket or saddle at a roof-to-wall intersection diverts water away from the junction, preventing water from pooling against the wall and finding pathways into the building. Without a cricket, water accumulates at the intersection, penetrates flashing joints, and causes leaks and structural deterioration. The cricket creates a sloped surface that channels water to either side of the intersection.

65. B — The NEC allows a maximum of six service disconnects at a single service location, often referred to as the "six-disconnect rule." For a building with six tenant spaces, the contractor can install one disconnect for each tenant within this limit. However, if additional disconnects are needed for building common areas, a main distribution panel may be required.

66. B — The water and drain connections are regulated plumbing work requiring a licensed plumber, and the electrical connection is regulated electrical work requiring a licensed electrician. Oregon licenses these trades separately to ensure installations meet code requirements and protect public health and safety. The general contractor coordinates between the trades but cannot perform the regulated work without the appropriate licenses.

67. D — Post-installed concrete anchors in existing concrete require special inspection to verify proper installation including hole diameter, depth, cleanliness, anchor type, and installation torque. Without special inspection, there is no independent verification that the anchors achieve the required pullout and shear capacity in the existing concrete. The building code mandates special inspection for these critical structural connections.

68. A — The sump pump discharge must be directed to an approved location that does not create a nuisance, cause erosion, or discharge onto adjacent properties. The discharge point must comply with local stormwater regulations and plumbing code requirements. Connecting the sump pump to the sanitary sewer is generally prohibited because it adds non-sewage water to the wastewater treatment system.

69. C — A detailed schedule with five hundred or more activities allows the contractor to track progress at a granular level, identifying potential delays while they can still be mitigated. The detail enables accurate resource allocation, realistic schedule updates, and precise reporting of progress to the owner. A simple milestone chart cannot provide the early warning of schedule issues that a detailed CPM schedule delivers.

70. D — Without smoke dampers in the ductwork penetrating the smoke barrier, the duct openings create unprotected pathways that allow smoke to migrate from one compartment to the adjacent compartment through the HVAC system. Smoke inhalation is the leading cause of death in building fires, and smoke barriers are designed to contain smoke within the compartment of origin. Missing dampers defeat this critical life safety function.

71. C — A title search reveals the property's ownership history, existing liens, easements, deed restrictions, and other encumbrances that could affect the construction project. Existing liens may take priority over the contractor's future lien rights, and easements may restrict where construction can occur. Understanding the title status before construction begins protects both the contractor and the homeowner.

72. B — Charging a refrigerant system without first performing a nitrogen pressure test risks introducing expensive refrigerant into piping that may have leaks, improperly brazed joints, or debris contamination. Undetected leaks cause refrigerant loss and environmental contamination, while debris damages compressors and expansion valves. The nitrogen test verifies system integrity at a fraction of the cost of lost refrigerant.

73. D — Oregon code requires carbon monoxide detectors in dwellings that have fuel-burning appliances such as gas furnaces, gas water heaters, gas fireplaces, or wood-burning stoves, or that have attached garages where vehicle exhaust can migrate into the living space. Carbon monoxide is an odorless, colorless gas that can cause death, making detection critical in homes with these potential CO sources.

74. B — A comprehensive value engineering evaluation must consider cost savings, structural adequacy, thermal performance, moisture management, durability, maintenance requirements, aesthetic impact, and long-term lifecycle costs. EIFS and precast concrete panels have fundamentally different performance characteristics in each of these categories. Evaluating only cost or schedule ignores critical factors that affect the building's long-term performance and owner satisfaction.

75. A — The recirculation system specified in the plans keeps hot water circulating through the piping so it is immediately available at each fixture without waiting for cold water in the pipes to be displaced. Without the recirculation pump, water must travel eighty feet from the heater to the master bathroom, resulting in significant wait time and wasted water. The contractor failed to install a specified system component.

76. C — Operation and maintenance manuals provide the building owner and maintenance staff with manufacturer documentation, maintenance schedules, troubleshooting guides, and operating instructions for all installed building systems. This information is essential for proper long-term operation, preventive maintenance, and warranty compliance throughout the facility's operational life. Incomplete O&M documentation leads to deferred maintenance and premature equipment failure.

77. D — Double-tapped connections at breaker terminals not designed for multiple conductors cannot maintain adequate contact pressure on both wires simultaneously. Over time, one or both connections loosen, creating high-resistance points that generate heat, cause arcing, and can ignite surrounding materials. The condition must be corrected by installing tandem breakers rated for the specific panel or adding new circuits.

78. B — The five-inch cable spacing exceeds the building code's maximum allowable opening for guardrail infill, which requires the infill to prevent passage of a four-inch-diameter sphere. This requirement protects small children from slipping through the guardrail openings. The contractor must add additional cables to reduce the spacing to less than four inches to comply with the building code.

79. C — The one-year workmanship warranty covers conditions that affect the functional performance of the completed work during the warranty period. Doors that stick and are difficult to open represent a functional deficiency that the contractor should address by adjusting or rehanging the doors. Whether the cause is settlement or other factors, the doors are not performing as intended and warrant correction.

80. D — A generator paralleling system provides redundancy by allowing multiple generators to share the load, so if one generator fails, the remaining units continue serving the critical loads without interruption. The system can also scale its output to match varying load conditions by bringing generators online or offline as needed, improving fuel efficiency during partial-load conditions. This operational flexibility is the primary advantage over a single large unit.