PRACTICE EXAM 9: TRADE SIMULATION (100 QUESTIONS)

Time Limit: 240 Minutes | Passing Score: 70%

Blended distribution covering both commercial and residential construction. Questions integrate cross-discipline scenarios requiring synthesis of multiple code provisions and construction principles.

SITEWORK (Questions 1–13)

1. A contractor is preparing to excavate a trench eight feet deep in soil classified as Type A. OSHA allows Type A soil to be cut at a maximum slope of ¾H:1V. What is the minimum total top width of the trench opening if the bottom width is four feet?

A. Eight feet at the top of the excavation

B. Ten feet at the top of the excavation

C. Fourteen feet at the top of the excavation

D. Sixteen feet at the top of the excavation

2. A construction project requires dewatering an excavation using a sump pump. OSHA requires the competent person to monitor the excavation when dewatering is in progress because water removal can cause what hazard?

A. Increased bearing capacity of the soil at the base of the excavation

B. Loss of soil cohesion and increased risk of sidewall collapse

C. Chemical contamination of the groundwater table in the vicinity

D. Excessive dust generation from the exposed dry soil surfaces

3. The APWA uniform color code uses orange paint or flags to mark which type of underground utility?

A. Potable water supply lines and distribution mains

B. Sanitary sewer and storm drain lines and culverts

C. Communication lines including fiber optic, cable TV, and telephone

D. Electrical power lines, conduit, and lighting cables

4. A residential lot has a natural drainage swale crossing the proposed building pad. The contractor must address the swale before construction by performing which action?

A. Redirecting the drainage around the building pad using grading and a diversion channel

B. Filling the swale with concrete to create a solid base for the foundation

C. Installing a french drain directly beneath the proposed foundation footings

D. Ignoring the swale because natural drainage patterns are self-correcting

5. A contractor performing residential grading work creates a fill slope adjacent to the property line. The IRC requires fill slopes to not exceed what maximum steepness unless an engineered retaining structure is installed?

A. One horizontal to one vertical for compacted structural fill

B. Three horizontal to one vertical for all residential fill slopes

C. Four horizontal to one vertical for slopes exceeding six feet

D. Two horizontal to one vertical for fill slopes without an engineered wall

6. OSHA requires that all utilities be located before excavation. If a utility cannot be located precisely by surface markings, the contractor must do what within the tolerance zone?

A. Use heavy machinery to excavate quickly through the uncertain area

B. Hand-dig or use vacuum excavation within the tolerance zone around marked utilities

C. Proceed with mechanical excavation at reduced speed and depth

D. Abandon the excavation in that area and relocate the work

7. A commercial building pad requires compacted fill to achieve a minimum of ninety-five percent Modified Proctor density. The contractor has been placing fill in twelve-inch lifts. A nuclear density test shows only eighty-eight percent compaction. What is the most appropriate corrective action?

A. Rework the lift by scarifying, moisture conditioning, and recompacting to the specified density

B. Add a second twelve-inch lift on top to increase the total compacted thickness

C. Accept the result because the seven-percent variance is within industry tolerance

D. Apply a chemical stabilizer to increase the density without recompacting

8. A contractor is excavating a trench for a residential water service line. The trench is four feet deep. Under OSHA, is a protective system required?

A. Yes, because protective systems are required for all excavations regardless of depth

B. No, because the depth is less than five feet and OSHA exemption applies automatically

C. Not necessarily — the competent person must evaluate the soil and determine if protection is needed for trenches under five feet

D. Yes, because water line trenches always require shoring regardless of depth

9. The IRC requires the finished floor elevation of a residential structure to be above the base flood elevation in flood hazard areas. This requirement is based on which regulatory program?

A. The OSHA construction site safety management program

B. The National Flood Insurance Program administered by FEMA

C. The EPA stormwater pollution prevention program requirements

D. The Army Corps of Engineers navigable waters protection act

10. A contractor discovers that underground power lines are marked with red paint within the proposed excavation area. The lines are shown at a depth of thirty-six inches. How should the contractor proceed with excavation in this area?

A. Use mechanical equipment to excavate to a depth of twenty-four inches and hand-dig the remainder

B. Relocate the entire excavation to avoid the power lines completely

C. Use only rubber-tired equipment to excavate near the power lines

D. Hand-dig or use vacuum excavation within the tolerance zone on each side of the marked location

11. A residential project requires a concrete driveway approach connecting to the public street. The approach must be constructed to match the existing curb height. What is the standard residential curb height above the gutter flow line?

A. Six inches as the standard residential curb reveal height

B. Eight inches for residential streets with mountable curb design

C. Four inches for curbs adjacent to residential driveways

D. Twelve inches for barrier curbs on all residential streets

12. A commercial construction site has a retention basin designed to capture stormwater runoff during construction. The basin must be sized to accommodate what minimum storm event for standard erosion control purposes?

A. A ten-year, one-hour storm event for permanent basin design

B. A fifty-year, twenty-four-hour storm for commercial construction

C. A two-year, twenty-four-hour storm event for standard construction erosion control

D. A one-hundred-year storm for any site within a flood plain

13. A contractor is backfilling a residential foundation. One section of the backfill is against a basement wall that has not yet been braced by the first-floor framing. What is the risk of backfilling before the floor framing is in place?

A. The backfill material will settle unevenly without the floor to contain it

B. The lateral earth pressure from the backfill could collapse the unbraced wall

C. The floor framing will not fit properly after the foundation settles

D. The waterproofing membrane will be damaged by the heavy backfill material

CONCRETE (Questions 14–29)

14. A contractor is designing a concrete mix for a commercial foundation in Arizona. The soil report indicates moderate sulfate concentration in the groundwater. Which cement type should be specified?

A. Type I general purpose portland cement with no modification

B. Type III high early strength for rapid form stripping

C. Type V for maximum sulfate resistance in all conditions

D. Type II portland cement for moderate sulfate resistance

15. A contractor is placing concrete for a twenty-foot-tall commercial wall using pump delivery. The concrete free-falls inside the form from the top. To prevent segregation, the contractor should use what equipment?

A. A drop chute or tremie tube to limit the free-fall distance within the form

B. A high-frequency vibrator inserted continuously from the top of the form

C. A retarding admixture to slow the concrete's descent through the form

D. Nothing additional because forms contain the concrete during free-fall

16. Concrete air entrainment is primarily specified for durability in what environmental exposure?

A. Hot, dry desert conditions to prevent thermal cracking during curing

B. Marine environments to prevent salt crystal formation in pores

C. Freeze-thaw cycling where the concrete is exposed to moisture and freezing temperatures

D. Below-grade exposure to sulfate-bearing soils and groundwater

17. A contractor pours a commercial slab-on-grade and begins bull floating immediately after screeding. Bleed water has not yet appeared on the surface. Is the timing of this operation correct?

A. No, the contractor should wait for bleed water to appear before bull floating

B. Yes, bull floating should be completed before bleed water rises to the surface

C. No, bull floating should occur only after the bleed water has fully evaporated

D. Yes, but only if the ambient temperature is below seventy degrees

18. A residential footing plan specifies No. 4 rebar with a minimum lap splice of twenty-four inches. The contractor splices two bars with only an eighteen-inch overlap. What is the consequence?

A. The splice may exceed code requirements depending on bar coating

B. The splice provides extra capacity because eighteen inches exceeds the minimum

C. The splice has no structural significance in residential footings

D. The splice is inadequate and does not develop the full strength of the bar

19. The standard concrete compressive strength test uses two cylinders tested at twenty-eight days. The average of these two cylinders constitutes one test result. If the two cylinders produce results of 4,200 psi and 3,600 psi, the test result is what value?

A. 3,900 psi as the average of the two cylinder breaks

B. 4,200 psi using only the higher of the two values

C. 3,600 psi using only the lower of the two values

D. The test is invalid because the spread exceeds allowable limits

20. A contractor notices that a concrete delivery truck has been waiting on-site for seventy-five minutes since batching. The specification limits discharge to ninety minutes. The concrete is still workable. Should the contractor accept this load?

A. Reject the load because the waiting time exceeds the acceptable maximum

B. Add water to extend the working time and proceed with placement

C. Accept the load because it is within the ninety-minute discharge window

D. Accept the load only if a retarding admixture was added at the batch plant

21. A contractor is forming a residential stem wall twenty-four inches tall. The wall will be poured in a single lift. What minimum form tie spacing prevents the forms from blowing out under the wet concrete pressure?

A. Form ties must be spaced according to the form manufacturer's rated capacity for the expected lateral pressure

B. Form ties are not needed for walls under thirty-six inches tall

C. Form ties should be spaced at forty-eight inches on center for all residential walls

D. Form ties are required only when the concrete slump exceeds six inches

22. A contractor pours a residential garage slab and finishes it with a hard steel trowel. Three months later, the surface becomes extremely slippery when wet from vehicle drippings. What caused this problem?

A. The concrete mix contained too much air-entraining admixture

B. The curing compound was applied too thickly after finishing

C. The hard trowel finish densified the surface creating a smooth, low-friction plane

D. The concrete was placed with a slump that was too low for garage applications

23. Expansion joints in concrete construction are different from control joints. Expansion joints allow for what type of movement that control joints do not?

A. Horizontal shear movement between adjacent slab sections

B. Both expansion and contraction of adjacent concrete elements by providing a full-depth separation

C. Vertical settlement of the subgrade beneath the slab

D. Rotational movement of the slab edges under applied loads

24. A contractor is pouring a residential pool deck using colored concrete. The integral color pigment is added at what stage of the mixing process?

A. After the concrete is placed in the forms as a surface broadcast

B. During the final finishing stage mixed into the surface with a trowel

C. During concrete curing as a topical stain applied to the fresh surface

D. At the batch plant during initial mixing for uniform distribution throughout the mass

25. Concrete placed in cold weather (below 40°F) must be protected from freezing for a minimum of how many days to prevent permanent damage?

A. The first twenty-four hours when the concrete is most vulnerable, with extended protection until adequate strength is achieved

B. Seven days regardless of the strength gain during that period

C. Fourteen days for all concrete placed below forty degrees

D. Three days provided the concrete temperature stays above fifty degrees

26. A contractor is placing concrete for a commercial elevated slab. The structural engineer specifies a maximum water-cement ratio of 0.45. The contractor orders 4,000-psi concrete. If the delivered concrete has a w/c ratio of 0.48, what action should the contractor take?

A. Accept the concrete because the strength specification controls over the w/c ratio

B. Add a water-reducing admixture at the jobsite to lower the w/c ratio

C. Reject the load because it does not meet the maximum water-cement ratio specification

D. Accept the load and add extra curing time to compensate for the higher ratio

27. A residential slab-on-grade develops cracks that form a closed pattern resembling a map or dried mud within the first few hours after placement. What type of cracking is this?

A. Settlement cracking from soft spots in the subgrade below

B. Plastic shrinkage cracking caused by rapid surface moisture evaporation

C. Drying shrinkage cracking from inadequate long-term curing

D. Structural cracking from excessive applied loads before adequate strength

28. A commercial concrete specification requires the concrete to achieve 3,000 psi at seven days for early form removal. The standard twenty-eight-day specification is 4,000 psi. Which cement type best meets both requirements?

A. Type V cement for maximum sulfate resistance and early strength

B. Type II cement for moderate heat generation and consistent strength gain

C. Type IV cement for low heat of hydration in mass concrete applications

D. Type III cement for high early strength development

29. A contractor is sawing control joints in a commercial warehouse floor. The saw cutting must be performed within what timeframe after concrete finishing to be effective?

A. Within four to twelve hours after finishing, before uncontrolled cracking begins

B. Within twenty-four to forty-eight hours after the concrete is placed

C. Within seven days of placement when the concrete has achieved design strength

D. Anytime within the first month as long as no cracks have appeared

MASONRY (Questions 30–39)

30. A contractor is building a commercial CMU wall and needs to grout the reinforced cells. The first grout lift is limited to what maximum height when cleanout openings are provided?

A. Four feet for the first lift in all grouted masonry applications

B. Six feet for walls with cleanouts at the base of grout pour

C. Five feet maximum for the first lift when cleanouts are provided

D. Twelve feet for high-lift grouting with continuous vibration

31. A residential masonry retaining wall develops a horizontal crack at mid-height after a heavy monsoon rain. What is the most likely cause?

A. Thermal expansion from the sun heating the exposed face of the wall

B. Hydrostatic pressure from water-saturated soil exceeding the wall's lateral capacity

C. Shrinkage of the mortar joints during the curing process

D. Settlement of the footing causing the wall to rotate at the base

32. A contractor specifies Type S mortar for a structural masonry wall supporting floor loads. What is the minimum compressive strength of Type S mortar?

A. 750 psi for general above-grade exterior applications

B. 2,500 psi matching Type M for maximum strength

C. 350 psi for non-load-bearing partition walls only

D. 1,800 psi as the minimum for Type S mortar

33. Flashing at the base of a masonry veneer wall must direct water to the exterior through weep holes. The flashing material extends from the backup wall outward past the face of the veneer by what minimum dimension?

A. Past the face of the veneer far enough to form a drip edge directing water away from the wall

B. Flush with the face of the veneer brick for a clean appearance

C. Three inches beyond the face of the veneer for maximum protection

D. The flashing terminates inside the veneer at the midpoint of the brick

34. A contractor is laying CMU in Arizona during summer when temperatures exceed 100°F. The freshly laid block wall must be protected from rapid drying by what method?

A. Covering the wall with black polyethylene to absorb heat and speed curing

B. Allowing full sun exposure to accelerate the mortar strength gain

C. Fog misting or covering the wall with wet burlap to prevent rapid moisture loss

D. Applying a liquid curing compound to the mortar joints immediately after tooling

35. A residential property has a CMU boundary fence wall that has developed significant step-crack damage from foundation settlement. The most effective repair strategy for structural step cracks is which approach?

A. Grinding out the damaged mortar and replacing it with color-matched new mortar

B. Addressing the foundation settlement first, then repairing or rebuilding the damaged wall sections

C. Applying a surface coating to hide the cracks and prevent further moisture entry

D. Installing horizontal joint reinforcement in every course above and below the crack

36. A contractor is constructing a commercial masonry elevator shaft. The shaft walls require a two-hour fire-resistance rating. What minimum CMU wall thickness is typically required?

A. Six-inch CMU with Type X drywall on the interior face

B. Eight-inch CMU with no additional fire-rated finish required

C. Ten-inch CMU with perlite-filled cores for enhanced fire rating

D. Eight-inch CMU fully grouted to achieve the two-hour rating

37. In a residential masonry veneer wall, the metal ties connecting the veneer to the backup structure must be made of what material?

A. Corrosion-resistant metal such as galvanized steel or stainless steel

B. Standard mild steel with a protective paint coating applied on site

C. Copper alloy for maximum longevity in all exposure conditions

D. Aluminum alloy for lightweight installation and corrosion resistance

38. A contractor is building a commercial masonry wall with a structural bond beam at the top. The bond beam must be reinforced with a minimum of how many bars?

A. One No. 4 bar centered in the bond beam grout

B. Three No. 3 bars distributed across the beam width

C. Two No. 4 bars as the standard minimum for bond beams

D. Four No. 5 bars for commercial bond beam applications

39. A residential CMU garden wall has a pilaster (thickened column) at one end. The pilaster serves what structural purpose in this wall?

A. A decorative feature that has no structural function

B. An end support providing lateral stability and resistance to overturning

C. A mounting point for gate hardware and fencing attachments

D. A foundation anchor that extends below the frost line

METALS / METAL FRAMING (Questions 40–49)

40. A contractor is erecting structural steel for a two-story commercial building. OSHA requires the steel erector to verify that column base plates are level and properly shimmed before erecting columns. Who is responsible for this verification?

A. The controlling contractor (general contractor) must verify base plate conditions before steel erection begins

B. The concrete subcontractor who poured the foundation piers

C. The structural engineer of record during a pre-erection site visit

D. The building inspector during the foundation inspection

41. A steel joist roof system requires diagonal bridging between joists. The bridging must be installed before any construction loads are placed. What is the minimum number of rows of bridging required for a forty-foot span K-Series joist?

A. One row of bridging at midspan for joists up to forty feet

B. Three rows equally spaced for joists spanning thirty-five to fifty feet

C. Per the SJI standard, the number of rows depends on the specific joist designation and span — refer to the manufacturer's erection drawing

D. Two rows at the one-third points for all joists over thirty feet

42. A CFS load-bearing wall header for a six-foot-wide garage entry in a residential project must support roof and ceiling loads. The header is typically constructed from which configuration?

A. A single solid wood beam set inside the CFS wall framing

B. A single CFS track turned sideways across the opening

C. A doubled CFS stud laid flat with blocking above and below

D. Back-to-back CFS studs with tracks top and bottom forming a box header

43. When welding structural steel in the field, the welder must be qualified under which standard?

A. AWS D1.1 Structural Welding Code — Steel for all structural welding

B. AISC Manual of Steel Construction for field bolt-up procedures

C. OSHA Subpart R for steel erection welding requirements only

D. ASTM A992 material specification for weldable steel grades

44. A CFS stud wall is sheathed with structural OSB panels for lateral bracing. The screw spacing at the panel edges for a standard shear wall is what interval?

A. Twelve inches on center at all panel edges and in the field

B. Six inches at edges and twelve inches in the field for standard shear walls

C. Three inches at edges and six inches in the field for high-load walls

D. Sixteen inches at edges matching the stud spacing on center

45. A contractor notices that several high-strength bolts in a steel connection have not been tightened to the required pretension. The connection is specified as slip-critical. What is the consequence of under-tightened bolts?

A. No consequence because the bolts are adequate in their current condition

B. The connection has reduced capacity for gravity loads only

C. The connection is weakened because the bolts are only in bearing

D. The connection may slip under load because insufficient friction exists between the faying surfaces

46. A commercial steel-framed building has open-web steel joists supporting a metal roof deck. The metal deck panels are attached to the joist top chords using what fastener type?

A. Structural adhesive applied between the deck ribs and the joist chord

B. Wood screws driven through the deck into nailer strips on the joists

C. Self-drilling screws or puddle welds connecting the deck to the joist top chord

D. Expansion anchors set into the joist chord from the underside

47. A contractor is framing a residential exterior wall with CFS studs. The studs must be connected to the bottom track using what minimum fastener configuration?

A. A minimum of one screw through each flange of the stud into the track

B. Two screws per flange at each stud-to-track connection point

C. Three screws total — one through each flange and one through the web

D. A single screw through the web of the stud into the track bottom

48. In a structural steel frame, the beam-to-column connection type determines how the frame resists lateral loads. A moment connection differs from a simple shear connection in what way?

A. A moment connection uses fewer bolts than a shear connection

B. A moment connection transfers both shear and bending moment, providing frame rigidity

C. A shear connection provides greater lateral resistance than a moment connection

D. A moment connection allows free rotation at the joint under lateral loads

49. CFS floor joists in residential construction are typically supported by a CFS track (rim track) at the perimeter. The rim track must be fastened to the wall framing below using what connection?

A. Construction adhesive applied between the track and the wall top plate

B. Clip angles bolted to both the rim track and the wall studs below

C. Nails driven through the track into the wood sill plate below

D. Screws through the rim track into the wall top track below at a specified spacing

CARPENTRY (Questions 50–64)

50. A contractor is framing a residential floor system using 2×12 joists at sixteen inches on center. The plans show a beam pocket where the floor joists meet a steel beam. What is the minimum joist bearing on the steel beam?

A. Three inches for joists bearing on steel beams

B. Two inches for joists bearing on steel or wood beams

C. One and one-half inches as the IRC minimum for wood or metal supports

D. Four inches for all joist-to-beam bearing conditions

51. A contractor is installing a wood ledger board for a residential deck. The IRC requires a minimum gap between the back of the ledger and the house sheathing when flashing is installed. What is the purpose of the flashing behind the ledger?

A. To direct water that penetrates behind the ledger to the exterior before it reaches the house framing

B. To provide additional structural support for the ledger attachment

C. To create a thermal break between the deck and the house wall

D. To prevent insect migration from the deck framing into the house wall

52. A residential roof truss has a bearing span of thirty-two feet. The truss manufacturer's drawings show a permanent lateral brace at the bottom chord. What is the purpose of this brace?

A. To support the ceiling drywall between the truss bottom chords

B. To prevent the bottom chord from buckling laterally under compression loads

C. To transfer wind loads from the roof surface to the foundation

D. To maintain the truss spacing at the specified on-center dimension

53. A contractor discovers that a 2×10 floor joist has a large knot at the bottom edge at midspan. Under grading rules, what structural concern does this defect create?

A. The knot increases the joist's resistance to splitting at the bearing point

B. The knot has no structural effect because it is in a compression zone

C. The knot creates a fire hazard because resin in knots is combustible

D. The knot reduces the joist's bending strength because the bottom edge is in tension at midspan

54. A contractor is framing a residential wall with 2×4 studs at sixteen inches on center. The wall height is ten feet. Under the IRC, what additional requirement applies to walls exceeding standard eight-foot height?

A. The IRC may not support 2×4 studs at ten-foot height under standard provisions

B. The studs must be increased to 2×6 for all walls over nine feet tall

C. The stud spacing must be reduced to twelve inches for the additional height

D. A mid-height horizontal nailer must be installed to prevent stud buckling

55. A contractor is installing a glulam ridge beam for a residential cathedral ceiling. The beam spans twenty-four feet and supports rafters on both sides. The beam size is determined by what engineering consideration?

A. The total tributary roof load (dead load plus live load) applied to the beam from both sides

B. The weight of the ceiling finish material attached to the underside of the beam

C. The wind uplift load on the ridge only, without consideration of gravity loads

D. The beam size is selected from a standard table regardless of span or loading

56. Engineered wood I-joists have specific limitations on field modifications. Which of the following is prohibited without manufacturer approval?

A. Cutting round holes in the web for mechanical runs per the manufacturer's hole chart

B. Cutting, notching, or modifying the flanges in any way

C. Installing web stiffeners at bearing points as required by the installation guide

D. Attaching metal joist hangers to the top flange at bearing connections

57. A contractor is building a commercial wood-framed building. The IRC does not apply to commercial construction. The applicable code for determining allowable wood framing sizes and spans in a commercial building is which document?

A. The local residential building code appendix for wood construction

B. The National Design Specification for Wood Construction with the IBC

C. The Steel Joist Institute standard for wood joist alternatives

D. The IBC referencing the National Design Specification (NDS) for Wood Construction

58. A residential stairway has a winder (pie-shaped) tread at the turn. The IRC requires the minimum tread depth at the narrow end of a winder tread to be what dimension?

A. Ten inches measured at the twelve-inch walk line from the narrow end

B. Eight inches at the narrowest point of the winder tread

C. Six inches at the narrow end of the winder tread

D. Four inches at the narrow end with ten inches at the walk line

59. A contractor is installing a residential garage door header using an LVL beam. The header must bear on jack studs at each end. What happens if the contractor installs the header bearing directly on the bottom plate without jack studs?

A. The header loads are not transferred properly to the foundation, creating a structural deficiency

B. The header performs identically because the bottom plate carries the load

C. The header gains additional capacity from the direct plate connection

D. The building inspector will approve this as an acceptable alternative

60. A contractor is sheathing a residential roof with OSB panels. The panels are stamped with an exposure rating of "Exposure 1." What does this rating mean?

A. The panel is rated for permanent outdoor exposure without protection

B. The panel can withstand limited fire exposure from exterior sources

C. The panel is rated for indoor use only with no moisture exposure

D. The panel can withstand moisture exposure during construction delays before being covered

61. When installing bottom wall plates on a concrete slab, the IRC requires a moisture barrier between the wood plate and the concrete. What material is typically used?

A. Standard roofing felt or polyethylene film as a sill plate gasket

B. A continuous bead of construction adhesive serving as both barrier and attachment

C. Pressure-treated lumber that does not require an additional moisture barrier

D. A closed-cell foam gasket specifically manufactured for sill plate installation

62. A contractor is framing an opening for a residential skylight in the roof framing. The framing around the skylight opening must be reinforced because the opening interrupts what structural element?

A. The roof diaphragm, which transfers lateral loads through the sheathing and framing

B. The ridge beam that supports the roof loads at the peak

C. The ceiling insulation that provides the thermal envelope

D. The soffit ventilation channel that runs from eave to ridge

63. A contractor is installing residential stair handrails. The IRC requires the top of the handrail to be at what height range measured vertically from the stair nosing line?

A. Thirty inches to thirty-six inches above the stair nosing line

B. Thirty-six inches to forty-two inches for all residential stairways

C. Thirty inches minimum with no maximum height specified

D. Thirty-four inches to thirty-eight inches above the stair nosing

64. A contractor is building a residential deck. The deck posts bear on concrete piers. The minimum dimension for a load-bearing deck post under the IRC is what size?

A. 4×4 nominal for decks up to eight feet above grade is commonly used

B. 6×6 nominal for all residential deck post applications

C. A minimum of 4×4 or 6×6 depending on the height, spacing, and load as determined by the IRC tables

D. 2×6 doubled members bolted together at twelve-inch intervals

THERMAL AND MOISTURE PROTECTION (Questions 65–75)

65. A contractor is installing spray foam insulation in a residential attic directly to the underside of the roof sheathing. The IRC requires certain spray foam products to be covered with an ignition barrier or thermal barrier. What is the difference?

A. A thermal barrier (½" drywall) is required in occupied spaces; an ignition barrier is permitted in attics

B. An ignition barrier provides a two-hour fire rating while a thermal barrier provides one hour

C. There is no difference — the terms are interchangeable for residential applications

D. A thermal barrier is required only in commercial construction, not residential

66. A residential home in Arizona has a tile roof. Condensation forms on the underside of the roof tiles during cool winter nights. What building component prevents this condensation from damaging the roof sheathing?

A. The roof insulation absorbs the condensation before it reaches the sheathing

B. The attic ventilation system removes moisture before it reaches harmful levels

C. The tile adhesive creates a waterproof bond between the tiles and the sheathing

D. The roof underlayment beneath the tiles serves as a secondary moisture barrier

67. A contractor is installing a residential water heater in an attached garage. The water heater must have its ignition source elevated to what minimum height above the garage floor?

A. Eighteen inches above the garage floor to prevent ignition of gasoline vapors

B. Twenty-four inches above the garage floor for all gas-fired appliances

C. Twelve inches above the floor for natural gas water heaters only

D. No minimum height requirement if the water heater has a sealed combustion chamber

68. A contractor is applying self-adhering window flashing tape to a residential window rough opening. The correct installation sequence for the flashing tape is which order?

A. Top first, then sides, then sill last to create a shingle-lap pattern

B. All four sides simultaneously using a continuous strip around the opening

C. Sill first, then sides, then head last so each upper piece overlaps the lower piece

D. Sides first, then head, then sill last for maximum adhesion

69. The IRC requires residential clothes dryer exhaust ducts to be constructed of what material?

A. Flexible plastic duct for easy installation and routing

B. Rigid or semi-rigid metal duct that will not trap lint or support combustion

C. PVC pipe matching the dryer manufacturer's outlet diameter

D. Flexible aluminum foil duct for routing around obstacles

70. A contractor is waterproofing a residential basement wall that will be below the water table. The IRC requires waterproofing rather than dampproofing in this situation. What is the key capability that waterproofing provides beyond dampproofing?

A. Resistance to hydrostatic pressure from standing water against the wall

B. Improved aesthetic appearance of the foundation exterior surface

C. Greater resistance to ultraviolet degradation from sun exposure

D. Enhanced resistance to root penetration from nearby landscaping

71. A residential roof has a plumbing vent penetration. The contractor installs the vent pipe boot (collar) by sliding it over the pipe. In what order should the boot base be integrated with the surrounding shingle courses?

A. The boot base is installed on top of all surrounding shingles for easy replacement

B. The boot base is installed beneath all surrounding shingles for complete coverage

C. The upper half of the boot base slides under the shingles above while the lower half overlaps the shingles below

D. The boot base slides under the shingles above, and the shingles below overlap the lower edge of the base

72. A contractor is installing exterior rigid foam insulation on a residential wall. The foam is one inch thick with an R-value of R-5. When combined with R-13 cavity insulation, what is the approximate total wall R-value?

A. R-13 because the cavity insulation dominates the assembly performance

B. R-5 because the exterior insulation is the only continuous layer

C. R-18 because the R-values of continuous layers are additive

D. R-10 because the exterior insulation reduces the cavity insulation effectiveness

73. A contractor is replacing the roof on an existing residential home. Two layers of asphalt shingles are already on the roof. Under the IRC, can the contractor install a third layer?

A. No — the IRC limits asphalt shingle roofing to a maximum of two layers before a complete tear-off is required

B. Yes, if the existing layers are in good condition with no visible damage

C. Yes, if the roof structure can support the additional weight of a third layer

D. No — the IRC requires a complete tear-off before installing any new shingles

74. A contractor is installing a pan-style metal roof on a residential home. The minimum fastener for attaching metal roofing panels to purlins or sheathing is what type?

A. Standard drywall screws with rubber washers for weather sealing

B. Hex-head self-drilling screws with EPDM neoprene washers

C. Ring-shank nails driven through pre-punched holes in the panels

D. Stainless steel pop rivets at each panel-to-purlin connection

75. The IRC requires a minimum roof slope for all roofing materials. What is the absolute minimum slope for any roof covering?

A. One-half inch per foot (½:12) for certain membrane-type coverings

B. One inch per foot (1:12) for all residential roof applications

C. Two inches per foot (2:12) for all shingle-type roof products

D. One-quarter inch per foot (¼:12) for built-up or membrane roofing

DOORS AND WINDOWS (Questions 76–81)

76. A contractor is installing an exterior door on a residential home. The IRC requires the door to open without a key from the interior. A door with a keyed lock on the interior side violates this requirement because of what safety concern?

A. The key may break in the lock preventing emergency maintenance access

B. The lock mechanism will freeze in cold weather preventing operation

C. Occupants may be trapped during an emergency if the key cannot be located

D. The key could be swallowed by a small child creating a choking hazard

77. A residential bedroom window has dimensions of twenty-four inches wide by thirty-six inches tall when fully open. The sill height is forty inches above the floor. Does this window meet IRC egress requirements?

A. Yes, it meets all three egress criteria: minimum width, minimum height, and minimum area

B. No, because the sill height exceeds the forty-four-inch maximum

C. No, because the total clear area of six square feet exceeds the maximum

D. Yes, but only for ground-floor bedrooms where the area minimum is reduced

78. Impact-resistant glazing is required by the IRC at locations near the bottom of stairways. Specifically, glazing in walls adjacent to a stairway landing must be tempered or safety glazed when the glazing is within what horizontal distance of the bottom stair tread nosing?

A. Twelve inches horizontally from the bottom tread nosing

B. Thirty-six inches horizontally from the bottom tread nosing

C. Sixty inches horizontally from the bottom tread nosing

D. Twenty-four inches horizontally from the bottom tread nosing

79. A contractor is installing a residential garage door. The IRC requires a pedestrian door between the garage and dwelling to have what self-closing feature?

A. A hydraulic closer that can be adjusted by the homeowner

B. An electronic closer connected to the garage door opener system

C. A magnetic hold-open device that releases during a fire alarm

D. A listed, self-closing device such as a spring hinge or door closer

80. A contractor is installing a window in a residential bathroom that is directly above a bathtub. Under the IRC, what type of glazing is required?

A. Standard single-pane glass with a privacy film applied

B. Low-E insulated glass with no additional safety requirement

C. Tempered or laminated safety glass because the window is in a hazardous location

D. Wired glass matching commercial shower enclosure standards

81. The IRC requires a minimum net clear opening width of twenty inches for emergency egress windows. A double-hung window with a twenty-six-inch frame width has a net clear opening of approximately what dimension when the lower sash is fully raised?

A. Twenty-six inches because the frame width equals the opening width

B. Approximately twenty-two to twenty-four inches after deducting the frame and hardware

C. Twenty inches because all double-hung windows meet the minimum exactly

D. Approximately twenty to twenty-two inches depending on the frame profile and balance hardware

FINISHES (Questions 82–89)

82. A contractor is hanging drywall on a residential ceiling with joists at twenty-four inches on center. What is the maximum drywall panel thickness that can be applied perpendicular to the joists at this spacing without sagging?

A. Three-eighths inch for twenty-four-inch spacing in all applications

B. Five-eighths inch is the recommended minimum for twenty-four-inch joist spacing

C. One-half inch for all residential ceiling applications regardless of spacing

D. Three-quarters inch for ceilings with twenty-four-inch framing

83. A contractor applies two coats of paint over new drywall without priming first. Within weeks, the paint begins to peel and show uneven sheen at the joints. What caused this failure?

A. The drywall compound absorbed the paint unevenly and the paper face did not bond properly without primer

B. The paint was applied too quickly without adequate drying time between coats

C. The drywall was defective from the manufacturer creating adhesion problems

D. The room temperature was too cold during application causing poor film formation

84. A contractor is installing natural stone tile on a commercial lobby floor. The tile must be set on what type of mortar bed?

A. A medium-bed or large-format tile mortar designed for natural stone and large-format tiles

B. Standard premixed mastic adhesive applied with a V-notch trowel

C. Type I organic adhesive for interior dry-area stone installations

D. A portland cement and sand mud bed floated to a minimum two-inch thickness

85. A contractor installs luxury vinyl plank (LVP) flooring in a residential kitchen directly over a concrete slab. Three months later, the planks begin to buckle and warp. What is the most likely cause?

A. The flooring was installed over wet concrete without a moisture test

B. The concrete surface was too rough for proper LVP adhesion

C. The LVP product was defective from the factory packaging

D. Moisture vapor transmission from the slab caused the planks to lose adhesion and deform

86. A contractor is finishing a residential stucco wall. The finish coat is applied too thickly and cracks within days. What caused this cracking?

A. The brown coat was not adequately cured before the finish coat was applied

B. The finish coat exceeded the maximum thickness, causing excessive shrinkage stress

C. The scratch coat had insufficient scoring to provide a key for the brown coat

D. The metal lath was installed with the cups facing downward instead of upward

87. The standard residential interior door height is what dimension?

A. Seven feet (84 inches) for all interior residential passage doors

B. Six feet eight inches (80 inches) as the standard interior door height

C. Six feet eight inches (80 inches) for standard heights with seven feet for custom

D. Seven feet six inches (90 inches) for homes with nine-foot ceilings

88. A contractor installs carpet in a residential bedroom over a wood subfloor. The homeowner complains of squeaking under the carpet within months of installation. What is the most common cause?

A. Loose subfloor fasteners allowing the panel to move against the joist when walked on

B. The carpet pad is too thick, creating excessive deflection underfoot

C. The tack strips were installed too close to the wall, pulling the carpet excessively

D. The wood subfloor has expanded due to moisture from the carpet pad adhesive

89. A commercial building requires a Level 5 drywall finish in a large open area with floor-to-ceiling windows. What specific treatment makes Level 5 different from Level 4?

A. Level 5 uses only two coats of compound on joints instead of the three used in Level 4

B. Level 5 requires sanding between every coat while Level 4 does not require sanding

C. Level 5 uses a heavier joint tape embedded in a thicker first coat than Level 4

D. Level 5 adds a full skim coat of compound over the entire surface to eliminate joint photographing

SAFETY AND CODE (Questions 90–100)

90. A contractor is building a single-story commercial building. The IBC requires a minimum of two exits. The two exits must be separated by a minimum distance equal to what fraction of the building's diagonal dimension?

A. One-quarter of the maximum overall diagonal dimension

B. One-half of the maximum overall diagonal dimension for non-sprinklered buildings

C. Two-thirds of the building's maximum diagonal dimension

D. One-third of the building's diagonal dimension for all conditions

91. OSHA requires a competent person to inspect a supported scaffold before each work shift and after any occurrence that could affect the scaffold's structural integrity. What authority must the competent person have?

A. Authority to immediately stop work and remove workers from the scaffold if a hazard is identified

B. Authority to modify the scaffold design without consulting an engineer

C. Authority to waive OSHA scaffold requirements for emergency situations

D. Authority to certify the scaffold for occupancy loads exceeding the rated capacity

92. The IBC assigns an occupancy group classification to every building based on its use. A building used as an elementary school is classified under which occupancy group?

A. Group A-3 for assembly and educational lecture halls

B. Group B for business and professional service offices

C. Group E for educational occupancies through the twelfth grade

D. Group I-4 for institutional care of persons under supervision

93. A commercial building has an occupant load of seven hundred fifty persons on one floor. Under the IBC, what is the minimum number of exits required from this floor?

A. Two exits for occupant loads up to one thousand persons

B. Four exits for all commercial floors regardless of occupant load

C. Two exits for occupant loads up to five hundred, so seven hundred fifty requires three

D. Three exits because the occupant load exceeds five hundred

94. A contractor is framing a commercial building and discovers that the fire-rated wall assembly shown on the plans requires two layers of five-eighths-inch Type X drywall on each side. This assembly provides what fire-resistance rating?

A. One hour with a single layer on each side of the wall

B. Two hours with two layers of Type X on each side of the wall

C. Three hours with two layers plus insulation in the cavity

D. Forty-five minutes with one layer of Type X on one side only

95. Under OSHA, the employer must provide training for workers who use fall protection equipment. The training must include instruction on which topics?

A. The nature of fall hazards, correct procedures for erecting and using fall protection, and the handling and storage of equipment

B. Only the proper way to wear a harness and connect the lanyard

C. Only a written test on OSHA fall protection regulations with no hands-on training

D. Verbal instruction from a co-worker who has previously used the equipment

96. A commercial building has a fire alarm system that includes both manual pull stations and automatic smoke detectors. Under the IBC, manual pull stations must be located at each exit from each floor and at what maximum height above the floor?

A. Thirty-six inches above the finished floor surface

B. Fifty-four inches above the finished floor surface

C. Forty-two to forty-eight inches above the finished floor

D. Sixty inches above the finished floor surface

97. The IBC requires corridors in commercial buildings to have a minimum width. For a corridor serving an occupant load of fifty or more persons, the minimum width is what dimension?

A. Thirty-six inches for low-occupancy office corridors

B. Forty-two inches for assembly occupancy corridors

C. Sixty inches for all corridors serving assembly spaces

D. Forty-four inches as the minimum for corridors serving fifty or more occupants

98. A residential home must have at least one smoke alarm in each bedroom, one outside each sleeping area, and one on each level of the dwelling. Under the IRC, these smoke alarms must be what type?

A. Interconnected so that activation of one alarm sounds all alarms in the dwelling

B. Battery-operated standalone units placed at the ceiling centerpoint

C. Hardwired only with no battery backup permitted in new construction

D. Photoelectric type only with no ionization detectors permitted

99. A contractor is building a residential swimming pool. The IRC requires a barrier (fence) around the pool with a minimum height of what dimension?

A. Thirty-six inches for pools in fenced backyard enclosures

B. Forty-eight inches with specific gate and latch requirements

C. Sixty inches for all residential swimming pool barriers

D. Forty-two inches matching the standard residential guardrail height

100. Under the IBC, an exit sign must be illuminated and visible from what maximum distance in a commercial building?

A. Fifty feet from any point along the exit access corridor

B. Seventy-five feet from any point along the path of egress

C. Twenty-five feet from the exit door in all occupancies

D. One hundred feet or the listed viewing distance of the sign, whichever is less

PRACTICE EXAM 9: ANSWER KEY AND EXPLANATIONS

1. D — For Type A soil sloped at ¾H:1V with an eight-foot depth, each side requires six feet of horizontal run (8 × 0.75 = 6). The total top width is the four-foot bottom width plus six feet on each side, equaling sixteen feet. This calculation is essential for determining the excavation footprint and property clearance requirements.

2. B — Removing water from an excavation can destabilize the sidewalls by reducing the soil's cohesion and removing the hydrostatic support that the water was providing. As pore water drains, soil particles may lose their bond, increasing the risk of sudden sidewall collapse into the excavation.

3. C — Orange marks communication lines including fiber optic, cable television, telephone, and signal lines under the APWA uniform color code. Red marks electrical, blue marks water, yellow marks gas, green marks sewer and storm drain, and purple marks reclaimed water.

4. A — A natural drainage swale must be redirected around the building pad using grading and a diversion channel or berm. Building over an active drainage path concentrates water against the foundation, causing saturation, hydrostatic pressure, and potential structural damage from undermining.

5. D — The IRC requires fill slopes to not exceed 2H:1V (two horizontal to one vertical) unless supported by an engineered retaining structure. This maximum steepness ensures stability of the fill material without the risk of slope failure that could damage the building or adjacent properties.

6. B — Within the tolerance zone (typically eighteen to twenty-four inches on each side of the marked utility), the contractor must hand-dig or use vacuum excavation to avoid damaging the underground utility. Mechanical equipment can sever or puncture utility lines, creating safety hazards and costly repairs.

7. A — The compacted lift must be reworked by scarifying the surface, adjusting the moisture content to optimum, and recompacting until the nuclear density test confirms ninety-five percent Modified Proctor density. Adding more fill on top of an under-compacted lift does not correct the deficiency — it compounds it.

8. C — For excavations under five feet deep, OSHA does not automatically require a protective system, but the competent person must evaluate the soil conditions and determine whether protection is needed. If the competent person identifies a potential cave-in hazard, protection must be provided regardless of the depth.

9. B — The National Flood Insurance Program (NFIP) administered by FEMA establishes base flood elevations and requires structures in flood hazard areas to have their lowest floor at or above the base flood elevation. This requirement is adopted into local building codes through floodplain management ordinances.

10. D — Underground electrical lines require careful handling. The contractor must hand-dig or use vacuum excavation within the tolerance zone around the marked location. Mechanical equipment can sever energized cables, creating electrocution hazards and power outages. The tolerance zone typically extends eighteen to twenty-four inches on each side.

11. A — Standard residential curb reveal (the exposed height above the gutter flow line) is six inches. This height provides adequate vehicle clearance while directing stormwater along the gutter. The driveway approach transitions from street grade through the curb cut to the driveway elevation.

12. C — Standard construction erosion and sediment control basins are typically designed to capture the runoff from a two-year, twenty-four-hour storm event. This design standard provides adequate capacity for routine construction-phase stormwater management without the cost of designing for extreme storm events.

13. B — Backfilling against an unbraced basement wall creates lateral earth pressure that the wall was not designed to resist without the counterbalancing support of the first-floor framing. The floor diaphragm acts as a horizontal brace at the top of the wall. Without it, the lateral pressure can push the wall inward or cause collapse.

14. D — Type II portland cement provides moderate sulfate resistance and is the appropriate choice for moderate sulfate concentrations in groundwater. Type V would be used for severe sulfate exposure. The soil report specifically indicates moderate concentration, making Type II the correct selection.

15. A — A drop chute or tremie tube limits the free-fall distance of concrete inside tall forms, preventing segregation. Concrete falling more than four to five feet separates — coarse aggregate bounces off the reinforcement and form walls while cement paste continues flowing, creating honeycombed areas of unmixed aggregate.

16. C — Air entrainment creates microscopic air bubbles that provide relief space for water expanding as it freezes within the concrete pores. Without entrained air, the hydraulic pressure from ice crystal formation causes internal cracking and surface scaling. Air entrainment is essential for any concrete exposed to freeze-thaw cycling.

17. B — Bull floating must be completed before bleed water rises to the surface. This operation embeds coarse aggregate and smooths the surface while the concrete is still plastic. Working the surface after bleed water appears traps the water beneath a densified layer, causing blistering, delamination, and dusting.

18. D — A twenty-four-inch lap splice was specified but only eighteen inches was provided. The shorter lap does not develop the full tensile capacity of the No. 4 bar because there is insufficient bond length between the bar and the surrounding concrete to transfer the required forces. The splice must be corrected.

19. A — The test result is the average of the two cylinders: (4,200 + 3,600) ÷ 2 = 3,900 psi. This single value is then compared to the acceptance criteria. If the specification is 4,000 psi, this individual test is 100 psi below — within the 500-psi tolerance — but the running average of three consecutive tests must still meet 4,000 psi.

20. C — The concrete is within the ninety-minute discharge window (seventy-five minutes elapsed with ninety minutes allowed). As long as the concrete has not begun initial set and remains workable, it may be accepted and placed. The contractor should verify the slump is within specification before discharge.

21. A — Form tie spacing must be calculated based on the form manufacturer's rated capacity and the expected lateral pressure from the wet concrete. Concrete exerts pressure that increases with depth, and the ties must resist this pressure without allowing the forms to bulge or fail. Manufacturer tables provide the correct spacing.

22. C — A hard steel trowel finish densifies and smooths the concrete surface, creating a very low-friction plane that becomes extremely slippery when wet from vehicle drippings, oil, or water. Garage floors should receive a broom or light trowel finish to provide adequate traction in wet conditions.

23. B — Expansion joints provide a full-depth separation between adjacent concrete elements, allowing both expansion and contraction without transmitting forces between the sections. Control joints are partial-depth cuts that control the location of contraction cracking but do not allow expansion movement.

24. D — Integral color pigment must be added at the batch plant during initial mixing to ensure uniform distribution throughout the entire concrete mass. Site-added pigment results in inconsistent color streaking. Integral color produces consistent color throughout the full depth, so chips and wear do not reveal a different color beneath.

25. A — Fresh concrete must be protected from freezing for at least the first twenty-four hours — the most vulnerable period — with continued protection until the concrete achieves sufficient strength to resist freeze damage. The specific duration depends on the concrete temperature, mix design, and ambient conditions.

26. C — When the specification includes both a strength requirement and a maximum water-cement ratio, both must be met independently. The w/c ratio of 0.48 exceeds the specified maximum of 0.45. The load must be rejected regardless of the expected strength, because the durability properties tied to w/c ratio are compromised.

27. B — Map cracking or pattern cracking within the first few hours after placement is classic plastic shrinkage cracking caused by rapid surface moisture evaporation. In Arizona's hot, dry, windy conditions, the evaporation rate can exceed the bleed rate, drying the surface before the concrete has gained any tensile strength.

28. D — Type III cement provides high early strength, making it ideal when both early form removal and standard twenty-eight-day strength are specified. Type III achieves in three to seven days what Type I achieves in fourteen to twenty-eight days, allowing faster construction progress without sacrificing long-term performance.

29. A — Control joints must be saw-cut within four to twelve hours after finishing — the specific timing depends on ambient conditions, concrete mix, and set time. Cutting too early ravels the joint edges; cutting too late allows random cracking to form before the saw can create the weakened plane.

30. C — When cleanout openings are provided at the base of the grout pour, the first lift is limited to a maximum of five feet. This height limit ensures the grout can be properly consolidated and inspected for voids. Subsequent lifts may be taller depending on the grouting method specified.

31. B — Hydrostatic pressure from water-saturated soil behind the retaining wall after heavy monsoon rain is the most common cause of horizontal mid-height cracking. The saturated soil dramatically increases the lateral pressure on the wall, exceeding the wall's bending capacity at the point of maximum stress.

32. D — Type S mortar has a minimum compressive strength of 1,800 psi, making it suitable for structural walls, below-grade applications, and walls subject to lateral forces. It provides a strong balance between compressive strength and adequate workability for field construction.

33. A — Base flashing at the bottom of masonry veneer must extend from the backup wall outward past the face of the veneer to form a drip edge. This projection directs collected water away from the wall face and into the weep holes, preventing staining and moisture re-entry at the base course.

34. C — Freshly laid masonry must be protected from rapid moisture loss in hot, dry conditions by fog misting the wall surface or covering it with wet burlap. Rapid drying prevents the mortar from achieving full hydration, resulting in weak, crumbly joints with poor weather resistance and reduced bond strength.

35. B — Structural step cracks from foundation settlement cannot be effectively repaired by repointing alone because the underlying cause — differential movement — will continue. The foundation settlement must be addressed first (underpinning, piering, or soil stabilization), then the damaged wall sections can be repaired or rebuilt.

36. D — An eight-inch CMU wall fully grouted with concrete achieves a two-hour fire-resistance rating without additional fire-rated finishes. The solid grouted mass provides sufficient thermal capacity to prevent heat transfer through the wall for two hours during a fire exposure.

37. A — Masonry veneer ties must be made of corrosion-resistant metal such as hot-dip galvanized steel or stainless steel. These ties are embedded in the mortar joints and enclosed within the wall cavity where they are exposed to moisture indefinitely. Non-corrosion-resistant ties deteriorate and lose their structural capacity.

38. C — Bond beams require a minimum of two No. 4 bars placed horizontally within the grouted channel. The two-bar minimum provides adequate bending and tensile resistance to distribute concentrated loads, resist lateral forces, and tie the wall together at the bond beam locations.

39. B — A pilaster at the end of a garden wall provides lateral stability and resistance to overturning from wind loads. The thickened section increases the wall's moment of inertia at the end, preventing the wall from rocking or toppling under lateral pressure.

40. A — The controlling contractor (typically the general contractor) is responsible for verifying that anchor bolt placement, base plate elevations, and concrete strength meet the requirements before steel erection begins. OSHA places this responsibility on the controlling contractor, not the steel erector.

41. C — The number of bridging rows required for K-Series joists depends on the specific joist designation, span, and loading conditions as shown on the SJI standard and the manufacturer's erection drawings. There is no universal rule for all forty-foot spans — the erection drawings are the authoritative source.

42. D — CFS headers for residential garage entries are constructed from back-to-back C-studs with tracks at the top and bottom forming a structural box beam. This assembly provides the bending strength needed to span the opening while maintaining the all-steel framing system.

43. A — All structural welding on steel construction must be performed by welders qualified under AWS D1.1 Structural Welding Code — Steel. This standard governs welder qualification testing, welding procedures, inspection, and acceptance criteria for all structural steel connections.

44. B — Standard CFS shear wall panel fastening requires screws at six inches on center at panel edges and twelve inches on center in the field (intermediate supports). This schedule provides the required shear resistance for the wall to function as part of the lateral force-resisting system.

45. D — In a slip-critical connection, the bolts must be pretensioned to generate enough friction between the faying surfaces to prevent any movement. Under-tightened bolts produce insufficient clamping force, allowing the connection to slip under applied loads — potentially causing misalignment and structural distress.

46. C — Metal roof deck panels are attached to steel joist top chords using self-drilling screws or puddle welds (also called burn-through welds). Self-drilling screws are the most common field method because they are fast, reliable, and do not require special welding equipment.

47. A — The minimum fastener configuration for CFS stud-to-track connections is one screw through each flange of the stud into the track. This provides two screws per connection point (one per side), creating adequate shear transfer and rotational resistance at the base and top of each stud.

48. B — A moment connection transfers both shear forces and bending moment between the beam and column, creating a rigid frame that resists lateral loads through the bending stiffness of the members and connections. Simple shear connections transfer only vertical shear and allow rotation at the joint.

49. D — The CFS rim track at the floor perimeter is connected to the wall top track below using screws driven through the rim track into the wall track at a specified spacing. This all-screw connection maintains the direct load path from the floor system through the wall to the foundation.

50. C — The IRC requires a minimum bearing of one and one-half inches for floor joists on wood or metal supports, including steel beams. This minimum applies regardless of the joist size or the support material, ensuring adequate contact area to transfer the joist reaction without localized crushing.

51. A — Flashing behind the deck ledger directs water that penetrates the bolt holes or the joint between the ledger and the house wall to the exterior before it can reach the house sheathing and framing. Without this flashing, water intrusion at the ledger connection is one of the leading causes of deck-related structural failure.

52. B — The permanent lateral brace at the bottom chord prevents the chord from buckling laterally under compression loads. In certain truss configurations and loading conditions, the bottom chord experiences compression that can cause it to bow sideways if not braced at the specified interval.

53. D — The bottom edge of a floor joist at midspan is in the tension zone where bending stresses are highest. A large knot at this location significantly reduces the joist's bending strength because the disrupted wood grain cannot resist tensile forces as effectively as clear, straight-grained wood.

54. C — The IRC standard provisions for 2×4 studs are based on maximum eight-foot or nine-foot wall heights depending on species and grade. At ten feet, the increased slenderness ratio may require closer spacing, larger studs, or engineering analysis to confirm the studs can resist the combined axial and lateral loads.

55. A — The beam size is determined by the total tributary roof load — the sum of dead loads (roofing, sheathing, framing) plus live loads (snow or construction) — applied from both sides of the ridge. The beam must support half the total roof span on each side, making the tributary area the primary sizing factor.

56. B — The flanges of engineered wood I-joists must never be cut, notched, or modified in any way without written approval from the manufacturer. The flanges carry all bending stresses and any reduction in their cross-section dramatically reduces the joist's load-carrying capacity.

57. D — Commercial wood-framed buildings are governed by the IBC, which references the National Design Specification (NDS) for Wood Construction for allowable stresses, connection design, and member sizing. The IRC applies only to one- and two-family dwellings and townhouses up to three stories.

58. C — The IRC requires winder treads to have a minimum depth of six inches at the narrow end, with the standard ten-inch tread depth measured at the twelve-inch walk line from the narrow side. These minimums ensure adequate foot placement even at the narrowest portion of the winder.

59. A — Without jack studs, the header loads have no direct path to the foundation. The header would bear on the bottom plate alone, which spans between the foundation and the first stud — creating a bending condition the plate was not designed to resist. Jack studs provide the essential vertical load path.

60. D — "Exposure 1" means the panel can withstand moisture exposure during normal construction delays before being permanently covered with roofing or siding. It is not rated for permanent outdoor exposure. This rating applies to the adhesive bond between the wood strands, not the wood itself.

61. A — The IRC requires a moisture barrier (sill gasket) between wood bottom plates and concrete slabs to prevent moisture wicking from the concrete into the wood. Standard roofing felt, polyethylene film, or manufactured sill gaskets are all acceptable materials for this application.

62. A — Cutting an opening in the roof sheathing and framing interrupts the roof diaphragm — the structural panel that transfers lateral wind and seismic forces across the roof plane. The framing around the skylight must be reinforced with headers and trimmers to restore the load path around the opening.

63. D — The IRC requires residential stair handrails to be between thirty-four and thirty-eight inches in height, measured vertically from the sloped line connecting the stair tread nosings. This range provides a comfortable gripping height for most adults ascending and descending the stairs.

64. C — Deck post size depends on the height, spacing, and tributary load as determined by the IRC deck post tables. While 4×4 posts are commonly used for low decks, taller decks with wider beam spacing or heavier loads may require 6×6 posts. The IRC tables provide the specific requirements.

65. B — A thermal barrier (minimum ½-inch gypsum drywall) is required when spray foam is exposed in occupied spaces to protect occupants from the toxic gases produced if the foam ignites. In unoccupied attic spaces, a less restrictive ignition barrier (such as 1.5-inch mineral fiber) is permitted instead.

66. D — The roof underlayment beneath the tiles serves as the secondary moisture barrier, catching any condensation or wind-driven moisture that passes through the tile courses. The underlayment directs this moisture down the roof slope and off the eave, protecting the sheathing from sustained wetting.

67. A — The IRC requires gas-fired water heaters in residential garages to have the ignition source elevated a minimum of eighteen inches above the garage floor. This height places the flame above the level where heavier-than-air gasoline vapors accumulate, preventing accidental ignition.

68. C — Window flashing tape must be installed in shingle-lap sequence: sill first, then jamb sides over the sill tape, then head tape over the jamb tape. Each upper piece overlaps the lower piece so water flowing down the wall drains over the laps rather than behind them.

69. B — The IRC requires residential dryer exhaust ducts to be constructed of rigid or semi-rigid metal duct. Flexible plastic and foil ducts trap lint, restrict airflow, and can support combustion — creating a serious fire hazard. Smooth metal duct allows lint to pass through to the exterior termination.

70. A — Waterproofing provides resistance to hydrostatic pressure — the force of standing water pushing against the below-grade wall. Dampproofing only resists moisture vapor and capillary moisture. When the water table is at or above the foundation level, waterproofing is required to prevent water intrusion.

71. D — The pipe boot base is installed so the upper half slides under the shingles above the penetration (water flows over the base), and the shingles below the penetration overlap the lower edge of the base (water flows from the base onto the shingles below). This shingle-lap integration ensures waterproof continuity.

72. C — R-values of continuous insulation layers are additive. The one-inch rigid foam (R-5) plus the cavity insulation (R-13) produces a total wall R-value of approximately R-18. The continuous exterior foam also eliminates thermal bridging through the studs, making the actual assembly performance even better than the simple sum.

73. A — The IRC limits asphalt shingle roofing to a maximum of two layers. When two layers already exist, a complete tear-off down to the roof deck is required before new shingles can be installed. This prevents excessive weight on the roof structure and ensures proper inspection of the deck condition.

74. B — Metal roofing panels are attached to purlins or sheathing using hex-head self-drilling screws with EPDM neoprene washers. The neoprene washer compresses against the panel surface when the screw is tightened, creating a waterproof seal at each fastener penetration.

75. D — The absolute minimum roof slope for any roof covering is one-quarter inch per foot (¼:12), which applies to built-up roofing and certain membrane systems. Steeper slopes are required for other materials: ½:12 for some standing seam metals, 2:12 for modified bitumen, and 4:12 for standard asphalt shingles.

76. C — A door that requires a key to open from the interior traps occupants during emergencies when the key cannot be found in the dark, smoke, or panic. Egress doors must be operable from the interior with a single motion, without a key, special knowledge, or special effort.

77. A — The window dimensions yield: clear width of twenty-four inches (exceeds twenty-inch minimum), clear height of thirty-six inches (exceeds twenty-four-inch minimum), and clear area of 24 × 36 = 864 square inches = 6.0 square feet (exceeds 5.7 square foot minimum for upper floors). The sill height of forty inches is below the forty-four-inch maximum. All criteria are met.

78. B — The IRC requires tempered or safety glazing in walls adjacent to stairway landings when the glazing is within thirty-six inches horizontally of the bottom tread nosing. This zone represents the area where a person falling at the bottom of the stairs is most likely to impact the glass.

79. D — The IRC requires the pedestrian door between the garage and dwelling to have a listed self-closing device — such as spring hinges, a hydraulic closer, or other approved mechanism — that automatically returns the door to the fully closed position after each use for fire protection.

80. C — Windows in or adjacent to bathtubs and showers are hazardous locations under the IRC. Tempered or laminated safety glass is required because a person standing in a slippery tub could fall and impact the glass, and tempered glass breaks into small granular pieces rather than dangerous shards.

81. D — The actual net clear opening of a double-hung window is always less than the frame width because the frame profile, balance hardware, and weather stripping reduce the usable opening. A twenty-six-inch frame typically yields approximately twenty to twenty-two inches of clear width depending on the manufacturer.

82. B — Five-eighths-inch drywall is the recommended minimum thickness for ceilings with twenty-four-inch joist spacing. Half-inch drywall at twenty-four-inch spacing is prone to sagging between the joists over time, especially in humid conditions. The additional thickness provides the stiffness needed to span the wider framing spacing.

83. C — Without primer, the porous drywall compound absorbs paint differently than the paper face, creating visible differences in sheen (joint banding) and poor adhesion. PVA primer seals both surfaces uniformly, creating consistent porosity and a proper base for the topcoat to bond to.

84. A — Natural stone and large-format tiles require a medium-bed or large-format tile mortar specifically formulated for these applications. Standard thin-set and mastic do not provide adequate bond strength or support for the weight and dimensional characteristics of natural stone tile.

85. D — Moisture vapor transmission from the concrete slab migrated through the LVP flooring, causing the planks to lose adhesion and warp. A concrete moisture test (calcium chloride or relative humidity method) should have been performed before installation. If moisture levels exceed the manufacturer's limits, a moisture mitigation system is required.

86. B — The finish coat was applied too thickly, causing the excess material to shrink more than the thin brown coat can accommodate. The resulting tensile stress exceeds the finish coat's strength,

producing map cracking across the surface. The finish coat should be approximately one-eighth inch thick maximum.

87. C — The standard residential interior door height is six feet eight inches (80 inches or 6'8"). Seven-foot (84-inch) doors are available as a custom or upgraded option for homes with higher ceilings. The 6'8" standard has been the industry norm for decades.

88. A — Floor squeaking under carpet is almost always caused by loose subfloor fasteners that allow the panel to move vertically when walked on. The movement creates friction between the panel and the joist, producing the characteristic squeak. Screwing the subfloor tightly to the joists with adhesive eliminates the problem.

89. D — Level 5 adds a full skim coat of joint compound over the entire drywall surface — not just the joints and fasteners — to create a perfectly uniform surface. This eliminates joint photographing (visible joint lines) under severe lighting conditions such as large windows, skylights, and surface-mounted fixtures.

90. B — The IBC requires two exits to be separated by a distance of at least one-half of the building's maximum overall diagonal dimension in non-sprinklered buildings. In fully sprinklered buildings, this is reduced to one-third. This separation ensures that a single fire cannot block both exit paths simultaneously.

91. A — The OSHA competent person must have the authority to immediately stop work and remove workers from the scaffold if a hazardous condition is identified. Both qualifications are required — the ability to identify hazards and the authority to take immediate corrective action. Knowledge without authority does not meet the definition.

92. C — Elementary and secondary schools through the twelfth grade are classified under Group E (Educational) in the IBC. This classification has specific requirements for means of egress, fire protection, and building area that reflect the unique safety needs of school-age children.

93. D — The IBC requires three exits for occupant loads between 501 and 1,000 persons. Two exits are sufficient for up to 500 occupants, and four exits are required for more than 1,000. Seven hundred fifty occupants falls in the 501–1,000 range, requiring three exits.

94. B — Two layers of five-eighths-inch Type X drywall on each side of a framed wall typically provides a two-hour fire-resistance rating. A single layer on each side provides approximately one hour. The exact rating depends on the complete listed assembly including framing type, insulation, and fastening.

95. A — OSHA fall protection training must cover the nature of fall hazards in the work area, the correct procedures for erecting, maintaining, and using fall protection systems, and the proper handling and storage of equipment. Training must be provided by a competent person before workers are exposed to fall hazards.

96. C — Manual fire alarm pull stations must be located between forty-two and forty-eight inches above the finished floor at each required exit from each floor. This height range places the pull station within easy reach of most adults, including those in wheelchairs, during an emergency evacuation.

97. D — The IBC requires a minimum corridor width of forty-four inches for corridors serving an occupant load of fifty or more persons. Corridors serving fewer than fifty occupants may be reduced to thirty-six inches. These minimums ensure adequate egress capacity during emergency evacuation.

98. A — The IRC requires all smoke alarms in new residential construction to be interconnected so that activation of any single alarm causes all alarms in the dwelling to sound simultaneously. This ensures that occupants in remote bedrooms are alerted regardless of which alarm detects the smoke first.

99. B — The IRC requires residential swimming pool barriers to be a minimum of forty-eight inches high with self-closing and self-latching gates. The latch release must be on the pool side of the gate at least fifty-four inches above the ground or equipped with a child-resistant mechanism.

100. D — Exit signs must be illuminated and visible from a maximum distance of one hundred feet or the listed viewing distance of the sign, whichever is less. This ensures that occupants can identify exit paths from any point along the exit access corridor, even in smoke or reduced visibility conditions.