

PRACTICE EXAM 6: TRADE SIMULATION (100 QUESTIONS)

Time Limit: 240 Minutes | Passing Score: 70%

Commercial weighting. This exam emphasizes field calculations, material identification, and code application with scenario-based problems distinct from Exam 5.

SITWORK (Questions 1–9)

1. A contractor is grading a building pad for a new commercial structure. The cut areas produce more material than the fill areas require. The excess material is called what?
 - A. Export material that must be hauled off-site for disposal or reuse
 - B. Structural fill that must be stockpiled on-site for future use
 - C. Borrow material that must be imported from an approved source
 - D. Waste material that must be spread evenly across the entire site

2. Type C soil has an unconfined compressive strength of less than 0.5 tsf. What is the maximum allowable slope ratio for an excavation in Type C soil?
 - A. Three-quarter horizontal to one vertical at a 53-degree angle
 - B. One horizontal to one vertical at a 45-degree angle
 - C. One and one-half horizontal to one vertical at a 34-degree angle
 - D. Two horizontal to one vertical at a 27-degree angle

3. Which color of paint or flag is used to mark underground potable water lines during the utility locating process?

- A. Yellow for gas, oil, and petroleum product lines
- B. Blue for potable water supply lines
- C. Green for sewer and drainage system lines
- D. Red for electrical power lines and conduit

4. A contractor is excavating a trench twelve feet deep in Type B soil. The trench walls must be sloped at what minimum ratio?

- A. Three-quarter horizontal to one vertical for the full depth
- B. One and one-half horizontal to one vertical for the full depth
- C. Two horizontal to one vertical with a bench at six feet
- D. One horizontal to one vertical for the full twelve-foot depth

5. The universal color code for marking proposed excavation areas on the ground surface before digging begins is what color?

- A. White paint or flags placed by the excavator
- B. Pink paint or flags placed by the survey crew
- C. Orange paint or flags placed by the utility company
- D. Purple paint or flags placed by the building inspector

6. A construction site receives two inches of rain overnight. Under OSHA excavation safety requirements, what must happen before workers re-enter the excavation the next morning?

- A. Workers may re-enter immediately if the trench box is still in position

- B. The project superintendent must give verbal authorization for re-entry
- C. The competent person must inspect the excavation and protective systems
- D. The excavation must be pumped dry before any worker enters

7. A contractor needs to install a water supply line parallel to and near a sanitary sewer line. What is the minimum horizontal separation required between the two utilities?

- A. Five feet of horizontal separation with the water line above
- B. Ten feet of horizontal separation between the two lines
- C. Eight feet of horizontal separation with proper bedding
- D. Twelve feet of horizontal separation in all soil conditions

8. A stabilized construction entrance is required at every point where vehicles exit the construction site onto a paved public road. What is the typical minimum length of the stabilized entrance?

- A. Twenty-five feet of crushed stone or gravel pad
- B. Thirty-five feet of compacted aggregate surface
- C. Forty feet of reinforced concrete or asphalt pad
- D. Fifty feet of crushed stone or gravel pad

9. Backfill around a foundation must be placed in compacted lifts. What materials should never be used for structural backfill?

- A. Clean gravel that has been screened and washed
- B. Engineered fill that has been tested and approved
- C. Organic soil, frozen material, and construction debris
- D. Native sand that has been screened to remove oversized particles

CONCRETE (Questions 10–23)

10. Portland cement Type V is designed for use in which environmental condition?

- A. Severe sulfate exposure in soil or groundwater
- B. General purpose construction with no special conditions
- C. Mass concrete placements requiring minimal heat generation
- D. Cold weather applications requiring rapid strength development

11. A contractor orders concrete specified at four thousand psi for a commercial building foundation. This specification refers to the concrete's minimum compressive strength at what age?

- A. Seven days after placement under standard curing conditions
- B. Fourteen days after placement under field curing conditions
- C. Fifty-six days after placement under accelerated curing
- D. Twenty-eight days after placement under standard curing conditions

12. Concrete segregation during placement is primarily caused by which construction practice?

- A. Using a vibrator with too low a frequency for the aggregate size
- B. Dropping concrete from excessive heights or flowing it over long distances
- C. Placing concrete in lifts that are too thin for the specified aggregate size
- D. Using a slump that is slightly lower than the specified range

13. The process of removing entrapped air from freshly placed concrete using an internal vibrator is called what?

- A. Screeding the surface to the correct elevation and profile

- B. Bull floating the surface to embed coarse aggregate particles
- C. Consolidation to densify the concrete and release trapped air
- D. Curing to maintain moisture for continued cement hydration

14. When using an internal vibrator in concrete, each insertion should penetrate through the current lift and how far into the previous lift?

- A. Approximately six inches into the previous lift to ensure bond
- B. The full depth of the previous lift for maximum consolidation
- C. Two inches into the previous lift for surface contact only
- D. No penetration into the previous lift to avoid over-vibration

15. A contractor is placing concrete for a commercial parking garage slab in July in Phoenix when the ambient temperature is 108°F. The concrete temperature at delivery is 95°F. Which problem is most likely to occur?

- A. The concrete will not achieve adequate compressive strength
- B. The aggregate will expand and cause immediate surface cracking
- C. The reinforcement will corrode prematurely from heat exposure
- D. The concrete may experience flash set before proper placement and finishing

16. Which concrete finishing operation immediately follows screeding and is performed before bleed water appears?

- A. Troweling to produce a smooth, dense surface finish
- B. Bull floating or darbying to embed aggregate and smooth the surface
- C. Edging to create a rounded profile at the form edges
- D. Brooming to create a non-slip textured exterior surface

17. Control joints in concrete slabs are cut to what fraction of the slab thickness to create a weakened plane for crack control?

- A. One-half of the slab thickness for full crack penetration
- B. One-third of the slab thickness for standard applications
- C. One-quarter of the slab thickness as the standard depth
- D. One-fifth of the slab thickness for lightly loaded slabs

18. A concrete cylinder test at seven days shows a compressive strength of 2,800 psi. The specified strength is 4,000 psi at twenty-eight days. Based on typical strength gain patterns, is the concrete likely on track to meet the specification?

- A. Yes, because concrete typically achieves sixty-five to seventy-five percent of its twenty-eight-day strength at seven days
- B. No, because the seven-day strength must be at least eighty percent of the specified value
- C. Yes, because seven-day results have no correlation to twenty-eight-day performance
- D. No, because the seven-day strength must equal or exceed the specified twenty-eight-day value

19. The standard concrete acceptance criterion requires that the average of any three consecutive strength tests must equal or exceed the specified strength, and no individual test may fall more than how many psi below the specified strength?

- A. Two hundred fifty psi below the specified compressive strength
- B. One hundred psi below the specified compressive strength
- C. Seven hundred fifty psi below the specified compressive strength
- D. Five hundred psi below the specified compressive strength

20. A contractor needs to place concrete for a retaining wall that will be permanently exposed to soil on one side. The minimum concrete cover for the reinforcing steel on the earth-contact side is what dimension?

- A. One and one-half inches for bars No. 5 and smaller
- B. Three inches for all reinforcement cast against earth
- C. Two inches for No. 6 bars and larger only
- D. Three-quarters of an inch for the interior face of the wall

21. What is the nominal diameter of a No. 8 reinforcing bar?

- A. Three-quarters of an inch based on the eighths system
- B. Five-eighths of an inch based on the standard designation
- C. Seven-eighths of an inch based on metric conversion
- D. One inch based on the standard eighths-of-an-inch system

22. Fly ash is a supplementary cementitious material added to concrete mixes. Which benefit does fly ash provide in hot climate construction?

- A. Increased air entrainment for improved freeze-thaw resistance
- B. Reduced heat of hydration and improved long-term strength
- C. Accelerated set time for faster form stripping in hot weather
- D. Increased water demand for improved workability in dry conditions

23. Honeycombing in concrete is a surface defect characterized by voids and exposed aggregate. What is the primary cause?

- A. Excessive vibration causing aggregate to settle to the bottom

- B. Too much water in the mix increasing porosity throughout
- C. Insufficient consolidation, too-stiff mix, or segregation during placement
- D. Premature form removal before the concrete achieved adequate strength

MASONRY (Questions 24–33)

24. Three courses of standard modular brick with mortar joints equal what total height?

- A. Eight inches, matching one course of standard CMU
- B. Twelve inches, matching one and one-half courses of CMU
- C. Six inches, matching three-quarters of a CMU course
- D. Ten inches, matching one and one-quarter courses of CMU

25. Which mortar type provides the best balance of strength and workability for general above-grade exterior masonry construction?

- A. Type M for maximum compressive strength above grade
- B. Type O for maximum workability and flexibility
- C. Type S for moderate lateral strength in exterior walls
- D. Type N for the best balance of strength and workability

26. Site-mixed mortar must be used within what maximum timeframe after initial mixing before it must be discarded?

- A. Ninety minutes after initial mixing regardless of conditions
- B. Two and one-half hours after initial mixing under normal conditions
- C. Four hours after initial mixing in moderate temperature conditions
- D. One hour after initial mixing in all weather conditions

27. A masonry veneer wall requires metal ties to connect the veneer to the backup wall. The maximum tie spacing is one tie per what area of wall surface?

- A. 2.67 square feet of wall area as required by code
- B. 4.5 square feet of wall area for standard brick veneer
- C. 1.5 square feet of wall area for seismic design categories
- D. 3.0 square feet of wall area for all residential applications

28. The minimum nominal thickness for a load-bearing masonry wall in single-story construction is typically what dimension?

- A. Four inches for non-load-bearing interior partitions
- B. Six inches for residential load-bearing applications
- C. Eight inches for standard load-bearing wall construction
- D. Twelve inches for all commercial load-bearing walls

29. Masonry lintels spanning openings above doors and windows require a minimum bearing length on each side of the opening. What is the typical minimum?

- A. Two inches or one-twelfth of the span, whichever is greater
- B. Three inches regardless of the opening width or load
- C. Six inches for all residential and commercial openings
- D. Four inches or one-eighth of the clear span, whichever is greater

30. Control joints in CMU walls should be placed at maximum intervals of what distance?

- A. Ten to fifteen feet for unreinforced walls in most conditions
- B. Twenty to twenty-five feet depending on reinforcement and exposure

- C. Thirty to thirty-five feet for fully grouted reinforced walls
- D. Forty to fifty feet for walls with continuous horizontal reinforcement

31. Efflorescence on masonry surfaces indicates what condition?

- A. Structural overload causing micro-cracking in the mortar joints
- B. Insect infestation within the hollow cores of the masonry units
- C. Inadequate curing of the mortar during initial construction
- D. Moisture movement through the masonry carrying soluble salts to the surface

32. What is the maximum air space permitted between masonry veneer and the backup wall?

- A. Two inches for all standard veneer applications
- B. Three inches for brick veneer over wood framing
- C. Four and one-half inches for masonry veneer construction
- D. Six inches for stone veneer with adjustable ties

33. A masonry wall develops stair-step cracks that follow the mortar joint pattern diagonally across the wall. This crack pattern is most commonly associated with what cause?

- A. Thermal expansion from excessive sun exposure on the wall face
- B. Moisture absorption causing the masonry units to expand
- C. Wind loading exceeding the lateral design capacity of the wall
- D. Differential settlement of the foundation beneath the wall

METALS (Questions 34–46)

34. A W14×30 wide-flange shape designation indicates a member with what approximate depth and weight?

- A. Fourteen-inch depth weighing thirty pounds per square foot
- B. Fourteen-inch nominal depth weighing thirty pounds per linear foot
- C. Fourteen-gauge material weighing thirty kilograms per meter
- D. Fourteen-millimeter thickness weighing thirty tons total

35. ASTM A36 structural steel has a minimum yield strength of what value?

- A. Thirty-six thousand pounds per square inch (36 ksi)
- B. Fifty thousand pounds per square inch (50 ksi)
- C. Forty-two thousand pounds per square inch (42 ksi)
- D. Twenty-nine thousand pounds per square inch (29 ksi)

36. K-Series open-web steel joists are available in depths ranging from 8 inches to 30 inches and can span up to approximately what maximum distance?

- A. Forty feet depending on depth and applied loading
- B. Eighty feet for the deepest K-Series sections available
- C. Sixty feet depending on the depth and loading conditions
- D. One hundred feet for K-Series joists with special bridging

37. LH-Series longspan steel joists are designed for spans that exceed the capacity of K-Series joists. LH-Series joists can span up to approximately what distance?

- A. Sixty feet for the smallest LH-Series depth sections
- B. Eighty feet for moderately loaded roof applications
- C. One hundred twenty feet for the deepest LH sections
- D. Ninety-six feet depending on depth and applied loading

38. The minimum bearing length for K-Series steel joists on steel supports is what dimension?

- A. Four inches on steel beam flanges or bearing plates
- B. Two and one-half inches on steel supports
- C. Three inches on steel columns with cap plates
- D. Six inches on steel girder top flanges

39. During steel joist erection, the hoisting cables must remain attached to each joist until what condition is met?

- A. At least one row of bridging is installed and fully connected at midspan
- B. The roof deck is installed over the joist providing lateral restraint
- C. The joist has been bolted at both bearing ends to the supporting structure
- D. The adjacent joist is set in position creating mutual lateral support

40. A CFS wall stud designated 600S162-54 has what web depth, flange width, and material thickness?

- A. Six-inch web with $1\frac{5}{8}$ -inch flanges and 43-mil thickness
- B. Six-inch web with $1\frac{5}{8}$ -inch flanges and 33-mil thickness
- C. Six-inch web with $1\frac{1}{2}$ -inch flanges and 27-mil thickness

D. Six-inch web with 1 $\frac{5}{8}$ -inch flanges and 54-mil material thickness

41. CFS framing for exterior applications or locations exposed to moisture requires galvanized coating of what minimum designation?

- A. G40 coating for moderate interior moisture conditions
- B. G60 coating for standard interior residential applications
- C. G90 coating for exterior and moisture-exposed applications
- D. G120 coating for all below-grade steel framing installations

42. In a bearing-type bolted connection, high-strength bolts must be tightened to what minimum condition?

- A. Snug-tight condition achieved by ordinary wrench effort
- B. Full pretension as verified by a calibrated torque wrench
- C. Finger-tight plus one-quarter turn using a standard wrench
- D. Turn-of-nut method with verification by direct tension indicator

43. A groove weld (butt weld) differs from a fillet weld in what primary characteristic?

- A. Groove welds are used only for non-structural connections
- B. Fillet welds require edge preparation while groove welds do not
- C. Groove welds are always smaller than fillet welds on the same joint
- D. Groove welds are deposited between members aligned end-to-end requiring edge preparation

44. The fall protection trigger height for steel erection workers under OSHA Subpart R is what minimum height?

- A. Six feet above a lower level matching general construction
- B. Fifteen feet above a lower level under the steel erection standard
- C. Ten feet above a lower level matching scaffold requirements
- D. Twenty feet above a lower level for structural steel only

45. Before steel erection begins, OSHA requires the controlling contractor to provide written confirmation of what condition?

- A. That the concrete in footings and foundations has achieved adequate strength
- B. That all underground utilities have been located and marked on site
- C. That the structural engineer has approved the erection sequence
- D. That the steel fabricator has completed all quality control inspections

46. A contractor notices that several anchor bolts in a column base plate are misaligned from the specified locations. Under OSHA and standard practice, what must happen before the column is erected?

- A. The column may be erected with temporary shims to compensate for misalignment
- B. The steel erector may ream the base plate holes to accommodate the bolt positions
- C. The anchor bolts must be corrected with engineering approval before erection proceeds
- D. The column may be erected if the misalignment is less than one-quarter inch

CARPENTRY (Questions 47–58)

47. The most commonly specified lumber grade for general residential structural framing is which designation?

- A. Select Structural for maximum allowable stress values
- B. No. 1 for high-quality structural applications
- C. Stud grade for all vertical load-bearing members
- D. No. 2 as the standard grade for general framing

48. Lumber stamped "KD" indicates what condition at the time of surfacing?

- A. The lumber was air-dried to a moisture content of twenty-five percent
- B. The lumber was kiln dried to a moisture content of nineteen percent or less
- C. The lumber was chemically treated for below-grade applications
- D. The lumber was pressure-treated for insect and decay resistance

49. Sill plate anchor bolts must be embedded a minimum of how far into the concrete or masonry foundation?

- A. Seven inches as required by the IRC for standard anchorage
- B. Five inches for residential and nine inches for commercial
- C. Four inches for all residential sill plate applications
- D. Ten inches for all foundation types regardless of material

50. Where floor joists meet over a bearing point, they must be lapped a minimum of what distance or connected with a splice?

- A. One and one-half inches matching the minimum joist bearing
- B. Six inches with a metal strap connecting the two joists
- C. Four inches with full-depth blocking between the joists
- D. Three inches minimum or butted and connected with an approved splice

51. A wood I-joist differs from a solid sawn lumber joist in what primary structural characteristic?

- A. Wood I-joists are heavier than solid sawn joists of the same depth
- B. Wood I-joists have lower allowable spans than comparable solid sawn members
- C. Wood I-joists span greater distances and are more dimensionally stable
- D. Wood I-joists require wider bearing surfaces than solid sawn joists

52. An LVL beam is manufactured from thin wood veneers bonded with adhesive under heat and pressure. For what application is LVL most commonly used?

- A. Interior wall studs where dimensional stability is critical
- B. Beams, headers, and rim boards requiring high strength and long spans
- C. Roof sheathing panels in high-wind exposure zones
- D. Subflooring material in areas subject to high moisture levels

53. The standard wall stud height for eight-foot ceilings using precut studs is what dimension?

- A. Ninety-two and five-eighths inches accounting for plates and ceiling height
- B. Ninety-six inches as a standard full eight-foot length
- C. Eighty-nine and one-quarter inches for nine-foot wall applications

D. Ninety-three inches rounded for standard construction tolerances

54. In a load-bearing wall, the header over a four-foot-wide window opening is typically built from which members?

- A. A single 2×6 set on edge with plywood spacers
- B. A single 4×6 solid timber beam with metal hangers
- C. Triple 2×4 members laid flat across the opening width
- D. Double 2×6 members set on edge with a plywood spacer

55. The structural panel sheathing fastening schedule for braced walls requires nails at what spacing?

- A. Eight inches at edges and sixteen inches in the field
- B. Four inches at edges and six inches in the field
- C. Six inches at edges and twelve inches in the field
- D. Three inches at edges and six inches in the field

56. In a conventional rafter roof, the ridge board serves what structural function?

- A. Alignment and nailing surface for opposing rafters, not a structural beam
- B. The primary structural support carrying all roof gravity loads
- C. Lateral bracing for the rafter top ends against wind uplift
- D. A compression member resisting the inward thrust from rafters

57. Roof sheathing panels must be installed with the long dimension in what orientation relative to the framing?

- A. Parallel to the rafters or truss top chords for maximum strength

- B. Perpendicular to the rafters or truss top chords for maximum span
- C. At forty-five degrees to the rafters for diagonal bracing effect
- D. In any direction provided the end joints are staggered properly

58. The minimum headroom clearance measured vertically from the sloped plane of stair tread nosings is what dimension under the IRC?

- A. Six feet six inches for secondary basement stairs only
- B. Seven feet for standard residential stairway applications
- C. Six feet ten inches for all residential stairway headroom
- D. Six feet eight inches as measured from the nosing line

THERMAL AND MOISTURE PROTECTION (Questions 59–68)

59. Thermal bridging through wood studs in an insulated wall reduces the effective R-value of the assembly. Which insulation strategy eliminates thermal bridging?

- A. Increasing the batt insulation thickness within the stud cavity
- B. Using higher-density batts compressed into the standard cavity
- C. Installing continuous rigid foam insulation on the exterior of the sheathing
- D. Doubling the number of studs to reduce the gap between members

60. The R-value of an insulation material measures what physical property?

- A. Resistance to heat flow per unit of thickness
- B. Resistance to moisture vapor transmission through the material
- C. Resistance to air leakage through gaps and joints
- D. Resistance to ultraviolet degradation from sun exposure

61. In Arizona's hot-dry climate (IECC Climate Zone 2), interior vapor barriers on exterior walls are generally treated how?

- A. Required on the warm side of the insulation facing the interior
- B. Not required and potentially counterproductive because they can trap moisture
- C. Required only on north-facing walls where condensation risk is highest
- D. Required on all exterior walls regardless of climate zone designation

62. A contractor is installing a single-ply EPDM membrane on a commercial roof. EPDM is a synthetic rubber membrane that is attached to the substrate by which method?

- A. Heat welding at all seams using a hot-air welding machine
- B. Torch application of hot asphalt at all laps and penetrations
- C. Mechanical fastening with concealed plate-and-screw systems
- D. Adhesive application, mechanical fastening, or ballasting depending on design

63. Kickout flashing (diverter flashing) is installed at what specific location on a building?

- A. At the base of a roof-to-wall intersection where roof runoff must be directed away from the wall below
- B. At the ridge cap where two opposing roof planes meet at the peak
- C. At the bottom of every window rough opening below the sill pan
- D. At every plumbing vent penetration through the roof surface

64. A built-up roofing system described as a "four-ply BUR" consists of how many layers of roofing felt alternated with asphalt?

- A. Two layers of felt with asphalt between and on top
- B. Three layers of felt with asphalt between each layer

- C. Four layers of felt alternated with layers of hot asphalt
- D. Five layers of felt with cold-applied adhesive between

65. Concrete and clay roof tile are popular in Arizona residential construction. Compared to asphalt shingles, tile roofing requires what additional structural consideration?

- A. Wider rafter spacing to accommodate the tile installation pattern
- B. Increased roof structural capacity to support the heavier weight of tile
- C. Steeper minimum roof pitch than required for asphalt shingles
- D. Reduced underlayment requirements due to the tile's waterproof nature

66. The minimum slope for standing seam metal roofing is typically what pitch?

- A. One-quarter to three inches per twelve inches depending on seam type
- B. Four inches per twelve inches matching asphalt shingle requirements
- C. Six inches per twelve inches for all metal panel profiles
- D. Two inches per twelve inches for all standing seam systems

67. An air barrier in the building envelope must be continuous to be effective. "Continuous" means the barrier must do what?

- A. Cover only the wall surfaces between windows and doors
- B. Be installed only on the windward side of the building
- C. Cover only the areas above the insulation in the attic space
- D. Wrap the entire building without gaps at transitions, penetrations, and joints

68. Sealant applied at construction joints and penetrations serves what role in the building envelope system?

- A. The primary moisture management strategy replacing all flashing
- B. A structural adhesive bonding dissimilar building materials together
- C. A flexible gap filler sealing the final joint between properly flashed components
- D. A vapor barrier preventing all moisture migration through the assembly

DOORS AND WINDOWS (Questions 69–73)

69. The minimum net clear opening height for an emergency egress window in a residential bedroom is what dimension?

- A. Twenty-four inches as the minimum clear opening height
- B. Twenty inches as the minimum clear opening height
- C. Thirty inches as the minimum clear opening height
- D. Eighteen inches as the minimum clear opening height

70. A thermally broken aluminum window frame differs from a standard aluminum frame in what way?

- A. The frame is manufactured from a thicker gauge of aluminum
- B. The frame uses stainless steel instead of standard aluminum alloy
- C. The frame has an anodized coating that increases thermal resistance
- D. The frame has a non-conductive material separating the interior and exterior sections

71. An insulated glazing unit (IGU) filled with argon gas instead of air provides what benefit?

- A. Increased visible light transmission through the glass assembly

- B. Reduced convective heat transfer between the glass panes
- C. Improved structural strength of the glazing unit against impact
- D. Enhanced UV protection for interior furnishings and finishes

72. Exterior doors in residential construction are typically what thickness?

- A. One and three-quarters inches ($1\frac{3}{4}$ ") for standard exterior doors
- B. One and three-eighths inches ($1\frac{3}{8}$ ") matching interior door thickness
- C. Two inches (2") for all exterior entry applications
- D. One and one-half inches ($1\frac{1}{2}$ ") for residential exterior doors

73. A casement window operates by what mechanism?

- A. Sliding horizontally on a track within the window frame
- B. Tilting inward from the top for cleaning and ventilation
- C. Swinging outward on side hinges operated by a crank mechanism
- D. Sliding vertically with counterweight or spring balance systems

FINISHES (Questions 74–79)

74. The standard drywall screw spacing for wall applications is what interval along each framing member?

- A. Twelve inches on center matching the ceiling spacing requirement
- B. Sixteen inches on center along each stud or framing member
- C. Twenty-four inches on center for non-load-bearing partitions
- D. Eight inches on center for all wall applications

75. Level 5 drywall finish includes a skim coat of compound over the entire surface. This finish level is used in which condition?

- A. For surfaces behind kitchen cabinets that will not be visible
- B. For areas that will receive heavy texture spray-applied finishes
- C. For ceilings in commercial lobbies with standard fluorescent lighting
- D. For surfaces where severe lighting conditions would reveal imperfections through paint

76. The correct installation sequence for ceramic tile on a shower wall substrate is which order?

- A. Install cement board, apply waterproof membrane, set tile with thinset, grout joints
- B. Install green board drywall, apply tile adhesive, set tile, grout with waterproof grout
- C. Install plywood substrate, apply mastic adhesive, set tile, seal with silicone
- D. Install standard drywall, apply waterproof paint, set tile with thinset, grout joints

77. Paint products are classified by sheen level. Which sheen provides the best washability and moisture resistance for kitchens and bathrooms?

- A. Flat or matte finish for maximum hiding of surface imperfections
- B. Eggshell finish for a soft appearance with moderate washability
- C. Semi-gloss finish for excellent washability and moisture resistance
- D. Satin finish for a balanced combination of sheen and cleanability

78. Before painting new drywall, the surface must first receive what preparatory coating?

- A. A coat of exterior-grade latex paint thinned with ten percent water
- B. A PVA drywall primer to seal the porous surface and provide a uniform base
- C. A coat of oil-based enamel to create a moisture-resistant barrier

D. A coat of the final topcoat paint applied at half thickness as a primer substitute

79. Luxury vinyl plank flooring has become popular in residential construction. What is a primary advantage of this material compared to hardwood flooring?

A. Greater hardness and scratch resistance than all hardwood species

B. Better thermal insulation value than solid hardwood flooring

C. Higher resale value than hardwood in all residential markets

D. Waterproof construction that resists moisture damage in wet areas

SAFETY (Questions 80–91)

80. OSHA's "Fatal Four" causes of construction fatalities include falls, struck-by, electrocution, and what fourth category?

A. Heat-related illness and dehydration on construction sites

B. Chemical exposure from hazardous material handling

C. Caught-in or caught-between incidents involving equipment or materials

D. Vehicle accidents involving construction equipment on roadways

81. Under OSHA's scaffold standard, scaffold platforms must be at least what minimum width?

A. Twenty-four inches wide for all scaffold platform applications

B. Twelve inches wide for light-duty single-person scaffolds

C. Thirty-six inches wide for heavy-duty material handling

D. Eighteen inches wide for standard work platform applications

82. A qualified person under OSHA is an individual who possesses what credentials?

- A. A recognized degree, professional certificate, or extensive knowledge and experience in the subject field
- B. Certification from OSHA following completion of the 30-hour training course
- C. A minimum of ten years of construction field experience documented by an employer
- D. Appointment by the general contractor as the designated safety representative

83. Safety Data Sheets (SDS) for hazardous chemicals on a construction site must be maintained in what condition of accessibility?

- A. Locked in the project superintendent's office for security purposes
- B. Available at the main company office during regular business hours
- C. Readily accessible to all employees at all times during work operations
- D. Distributed to each employee individually at the start of the project

84. The OSHA hazard communication standard requires chemical container labels to include which elements?

- A. Only the product name and the manufacturer's contact information
- B. Product identifier, hazard pictograms, signal words, hazard statements, and manufacturer information
- C. A simplified warning label with the word "DANGER" in red lettering
- D. Only the chemical formula and the permissible exposure limit value

85. Under OSHA, hard hats classified as Class E (Electrical) provide voltage protection up to what level?

- A. Twenty thousand volts of electrical protection rating
- B. Two thousand two hundred volts of electrical protection

- C. Fifty thousand volts of electrical protection rating
- D. No electrical protection for conductive applications

86. The alternative to GFCI protection on temporary construction circuits is which program?

- A. A weekly visual inspection of all extension cords by the foreman
- B. A monthly testing program conducted by a licensed electrician
- C. Annual replacement of all temporary wiring and cord sets
- D. An Assured Equipment Grounding Conductor Program (AEGCP)

87. Under OSHA's lockout/tagout procedures, who is the only person authorized to remove a lock from an energy-isolating device?

- A. The project superintendent after confirming all work is complete
- B. The person who applied the lock to ensure the circuit is safe to re-energize
- C. Any qualified electrician who has been trained in LOTO procedures
- D. The building owner or their designated representative on site

88. Scaffold planks must extend over their end supports by at least six inches but not more than what maximum overhang?

- A. Eighteen inches unless the planks are cleated to prevent sliding
- B. Twenty-four inches for scaffolds over twenty feet in height
- C. Twelve inches unless they are cleated or otherwise restrained
- D. Eight inches for standard scaffold plank overhang limits

89. Noise levels on construction sites that exceed 85 decibels as an eight-hour time-weighted average require employers to provide what type of PPE?

- A. Hearing protection such as earplugs or earmuffs for exposed workers
- B. Full-face respirators with built-in noise reduction capability
- C. Sound-dampening hard hats with integrated ear protection
- D. Communication headsets that limit noise transmission to safe levels

90. When OSHA conducts an inspection and finds a willful violation, the maximum penalty per violation is approximately what amount?

- A. Sixteen thousand dollars per willful violation as adjusted annually
- B. Fifty thousand dollars per willful violation regardless of severity
- C. Seventy-five thousand dollars per willful violation maximum
- D. Over one hundred sixty thousand dollars per willful violation as adjusted annually

91. Under OSHA, workers must not enter excavations where water is accumulating unless which precaution is taken?

- A. The excavation has been pumped completely dry within the last hour
- B. Adequate precautions are taken including dewatering, special supports, or harnesses and lifelines
- C. The competent person has confirmed the water depth is less than six inches
- D. All workers are equipped with waterproof boots and fall protection harnesses

GENERAL BUILDING CODE (Questions 92–100)

92. Under the IBC, a building used primarily for office space is classified under which occupancy group?

- A. Group M for mercantile and sales operations
- B. Group A for assembly of persons in the space
- C. Group B for business and professional services
- D. Group E for educational and instructional purposes

93. The occupant load of a space is calculated by dividing the floor area by the occupant load factor. A business occupancy has an occupant load factor of what value?

- A. One hundred fifty gross square feet per person
- B. Fifty net square feet per person for office spaces
- C. Fifteen net square feet per person matching assembly use
- D. Three hundred gross square feet per person for storage areas

94. Under the IBC, a fire-rated exit stairway serving four or more stories must have a fire-resistance rating of what duration?

- A. Thirty minutes for all exit stairway enclosures
- B. One hour for exit stairways serving up to three stories
- C. Forty-five minutes for exit stairways in sprinklered buildings
- D. Two hours for exit stairways serving four or more stories

95. The minimum design live load for office floor areas under the IBC is what value?

- A. Forty pounds per square foot matching residential live loads
- B. Fifty pounds per square foot for standard office occupancies
- C. Seventy-five pounds per square foot for all commercial floors
- D. One hundred pounds per square foot matching corridor requirements

96. The IBC requires a minimum of three exits for buildings with an occupant load in what range?

- A. Two hundred one to five hundred occupants requiring three exits
- B. Three hundred one to seven hundred fifty occupants requiring exits
- C. Five hundred one to one thousand occupants requiring three exits
- D. Over one thousand occupants requiring three or more exits

97. Under the IBC, Type I-A construction requires the structural frame to have a fire-resistance rating of what duration?

- A. Three hours for the structural frame in Type I-A construction
- B. Two hours for the structural frame in all Type I buildings
- C. One hour for the structural frame with sprinkler reduction
- D. Four hours for the structural frame in essential facilities

98. Which occupancy group classification under the IBC applies to hotels and motels?

- A. Group R-3 for one- and two-family residential dwellings
- B. Group R-2 for apartment buildings and condominiums
- C. Group B for transient business and professional services

D. Group R-1 for hotels, motels, and transient lodging facilities

99. The width of an exit component is calculated by multiplying the occupant load by what factor for stairways?

- A. 0.15 inches per person for stairways and corridors
- B. 0.2 inches per person for stairways as required by the IBC
- C. 0.3 inches per person for stairways in assembly occupancies
- D. 0.5 inches per person for stairways in high-rise buildings

100. Under the IBC, the maximum allowable height and area for a building are determined by cross-referencing which two classifications?

- A. The building's structural system and the seismic design category
- B. The building's fire alarm system type and the sprinkler coverage area
- C. The building's occupancy classification and its construction type
- D. The building's geographic location and the applicable wind speed

PRACTICE EXAM 6: ANSWER KEY AND EXPLANATIONS

1. A — When cut volumes exceed fill volumes on a site, the excess material is called export because it must be hauled off-site for disposal or reuse elsewhere. The opposite condition — when fill volumes exceed cut — requires importing borrow material from an off-site source. Accurate earthwork calculations minimize export and borrow costs.
2. C — Type C soil requires a maximum slope of 1½H:1V, which is a 34-degree angle from horizontal. This is the most gradual of the three OSHA slope categories, reflecting the weakest soil classification. Type C includes granular soils, submerged soils, and soils from which water is seeping.
3. B — Blue is the APWA universal color code for potable water supply lines. Yellow marks gas, oil, and petroleum; red marks electrical; orange marks communications; green marks sewer and storm drain; purple marks reclaimed water. Knowing these color codes prevents accidental utility strikes during excavation.
4. D — Type B soil requires a maximum slope of 1H:1V (one horizontal to one vertical), which is a 45-degree angle. This applies for the full depth of the twelve-foot excavation. If the soil were Type A, the slope would be ¾H:1V; if Type C, it would be 1½H:1V.
5. A — White paint or flags are placed by the excavator (the person requesting the dig) to mark the proposed excavation area on the ground surface. Utility companies then mark their underground lines using the APWA color codes. White marks tell the utility locators exactly where to focus their locating efforts.
6. C — OSHA requires the competent person to inspect the excavation, adjacent areas, and protective systems after every rainstorm or other hazard-increasing occurrence. Rain can saturate soil, undermine trench walls, and compromise shoring systems. No worker may enter until the competent person confirms conditions are safe.
7. B — The standard minimum horizontal separation between a water supply line and a sanitary sewer line is ten feet. This distance prevents contamination of the potable water supply if the sewer line leaks. When the minimum separation cannot be achieved, special construction methods and approvals are required.
8. D — A stabilized construction entrance must be at least fifty feet long to allow vehicles to shed mud and sediment from their tires before reaching the paved road. The entrance consists of crushed stone or gravel at least six inches deep. This is a standard erosion and sediment control BMP.

9. C — Organic soil, frozen material, and construction debris must never be used as structural backfill. Organic material decomposes and creates voids, frozen material thaws and settles, and debris creates unpredictable voids and settlement. Only approved, tested, granular or engineered fill should be used for structural backfill.
10. A — Type V portland cement is designed for severe sulfate exposure in soil or groundwater. It has the highest sulfate resistance of all standard cement types and is specified when sulfate concentrations exceed the threshold for Type II moderate sulfate resistance.
11. D — Concrete compressive strength specifications reference twenty-eight days as the standard acceptance age under standard curing conditions. When a contractor orders four-thousand-psi concrete, the mix is designed to achieve that minimum strength at twenty-eight days as verified by cylinder break tests.
12. B — Concrete segregation — the separation of coarse aggregate from the cement paste — is primarily caused by dropping concrete from excessive heights, flowing it over long distances horizontally, or using overly fluid mixes. Drop heights should be limited and concrete should be placed as close to its final position as possible.
13. C — Consolidation is the process of removing entrapped air from freshly placed concrete using an internal vibrator. Proper consolidation eliminates voids, ensures the concrete fully surrounds the reinforcement, and densifies the mix to achieve maximum strength and durability.
14. A — Each vibrator insertion should penetrate approximately six inches into the previous lift to knit the two layers together and ensure monolithic behavior. This overlap prevents a cold joint or weak plane between lifts that could reduce the structural integrity of the placement.
15. D — At concrete temperatures near or above 90°F, the hydration reaction accelerates rapidly and the concrete may experience flash set — stiffening before it can be properly placed, consolidated, and finished. In extreme Arizona heat, retarding admixtures, ice in the mix water, and shaded curing are essential countermeasures.
16. B — Bull floating or darbying immediately follows screeding and is performed to embed coarse aggregate, remove high and low spots, and smooth the surface. This operation must be completed before bleed water appears. No finishing should occur over bleed water.
17. C — Control joints are cut to one-quarter of the slab thickness to create a weakened plane where cracking will occur in a controlled, straight line. For a four-inch slab, the saw cut depth is one inch. Joints are typically spaced at twenty-four to thirty-six times the slab thickness.
18. A — Concrete typically achieves sixty-five to seventy-five percent of its twenty-eight-day strength at seven days. At 2,800 psi, the concrete is at seventy percent of 4,000 psi, which is within the normal range. The seven-day test is an early indicator, with the official acceptance test at twenty-eight days.

19. D — The ACI 318 acceptance criterion requires that no individual strength test (average of two cylinders) fall more than five hundred psi below the specified compressive strength. Additionally, the running average of any three consecutive tests must equal or exceed the specified strength.
20. B — Concrete cast against and permanently exposed to earth requires a minimum of three inches of cover over all reinforcement, regardless of bar size. This generous cover protects the steel from the aggressive below-grade environment including moisture, chemicals, and potential corrosion.
21. D — Using the standard eighths-of-an-inch system, a No. 8 bar has a nominal diameter of $\frac{8}{8}$ inch, which equals one inch. This makes quick mental calculation possible: No. 4 = $\frac{1}{2}$ inch, No. 5 = $\frac{5}{8}$ inch, No. 6 = $\frac{3}{4}$ inch, No. 7 = $\frac{7}{8}$ inch, No. 8 = 1 inch.
22. B — Fly ash reduces the heat of hydration, which is beneficial in hot climate construction where thermal cracking is a concern. It also improves long-term strength gain, workability, and sulfate resistance. Fly ash replaces a portion of the portland cement, reducing both cost and environmental impact.
23. C — Honeycombing is caused by insufficient consolidation, a mix that is too stiff to flow around reinforcement, or segregation during placement that concentrates coarse aggregate at the form face. Proper vibration technique, adequate slump, and controlled placement prevent this defect.
24. A — Three courses of standard modular brick ($2\frac{1}{4}$ -inch height with $\frac{3}{8}$ -inch joints = $2\frac{5}{8}$ inches per course \times 3 courses = $7\frac{7}{8}$ inches, but the modular coordination target is 8 inches) equals the height of one standard CMU course. This modular relationship allows brick veneer and CMU backup to be coursed together.
25. D — Type N mortar provides the best balance of strength (minimum 750 psi) and workability for general above-grade exterior construction. It is the most commonly specified mortar type for above-grade masonry walls because it accommodates minor movement without cracking.
26. B — Site-mixed mortar must be used within two and one-half hours after initial mixing under normal conditions. After this time, the mortar begins to stiffen from hydration and can no longer be properly worked. Retempering (adding water) is permitted to restore workability within this window.
27. A — Masonry veneer ties must be spaced at a maximum of one tie per 2.67 square feet of wall area, which typically works out to one tie every thirty-two inches horizontally at sixteen-inch vertical intervals. These ties transfer lateral loads from the veneer to the structural backup wall.
28. C — The minimum nominal thickness for a load-bearing masonry wall is eight inches (standard CMU width) for most single-story construction applications. Six-inch units may be used for specific non-load-bearing partitions, but load-bearing walls generally require the eight-inch minimum.

29. D — Masonry lintels require a minimum bearing length of four inches or one-eighth of the clear span, whichever is greater, on each side of the opening. This ensures adequate bearing area to transfer the lintel reactions to the supporting masonry without crushing.
30. B — Control joints in CMU walls should be placed at twenty to twenty-five feet on center for unreinforced or partially reinforced walls, depending on moisture conditions and exposure. These joints allow the wall to accommodate shrinkage and thermal movement without developing uncontrolled cracking.
31. D — Efflorescence indicates that moisture is moving through the masonry and carrying soluble salts to the surface, where they are deposited as the water evaporates. While primarily an aesthetic issue, it signals that moisture management in the wall assembly may need improvement.
32. C — The maximum air space between masonry veneer and the backup wall is four and one-half inches. The minimum is one inch. This air space serves as the drainage cavity and must remain clear of mortar droppings that could bridge the cavity and create moisture pathways.
33. D — Stair-step cracking that follows the mortar joints diagonally across a masonry wall is the classic indicator of differential settlement of the foundation. The wall cracks along the weakest plane — the mortar joints — in response to uneven movement of the supporting foundation.
34. B — The W14×30 designation means the member has a nominal depth of approximately fourteen inches and weighs thirty pounds per linear foot. The W indicates a wide-flange shape, the first number is the approximate depth in inches, and the second is the weight in pounds per foot.
35. A — ASTM A36 structural steel has a minimum yield strength of 36,000 psi (36 ksi). While largely superseded by ASTM A992 (50 ksi) for wide-flange shapes, A36 remains in use for plates, angles, channels, and miscellaneous structural shapes.
36. C — K-Series open-web steel joists can span up to approximately sixty feet depending on the specific depth and applied loading conditions. The deeper K-Series sections (K28, K30) achieve the longest spans, while shallower sections are limited to shorter distances.
37. D — LH-Series longspan joists can span up to approximately ninety-six feet depending on depth and loading. They are available in depths from 18 inches to 48 inches and fill the gap between the sixty-foot maximum of K-Series joists and the longer spans requiring DLH-Series deep longspan joists.
38. B — K-Series steel joists require a minimum bearing length of two and one-half inches on steel supports. This is shorter than the four-inch minimum required on masonry or concrete because steel bearing surfaces provide more concentrated and reliable load transfer.
39. A — Hoisting cables must remain attached to each joist until at least one row of erection bridging is installed and fully connected at or near midspan. This initial bridging provides lateral stability to the slender top chord, preventing lateral buckling that could cause the joist to collapse.

40. D — The CFS designation 600S162-54 indicates a stud with a 6-inch web depth, 1 $\frac{5}{8}$ -inch flanges, and 54-mil material thickness. The numbering system encodes all three critical dimensions: web depth in hundredths of an inch, flange width in hundredths, and thickness in mils.
41. C — G90 galvanized coating is required for CFS framing in exterior applications or locations exposed to moisture. G90 provides 0.90 ounces of zinc per square foot of surface area, offering significantly more corrosion protection than G60 interior coatings.
42. A — In bearing-type connections, high-strength bolts need only be tightened to snug-tight condition — the tightness achieved by ordinary wrench effort. Full pretensioning is required only for slip-critical connections where the joint must resist forces through friction rather than bolt shear and bearing.
43. D — Groove welds (butt welds) are deposited between members aligned end-to-end, with the weld metal filling a prepared groove between the edges. Edge preparation — beveling, J-grooving, or V-grooving — is required to allow complete weld penetration, unlike fillet welds that require no edge preparation.
44. B — OSHA Subpart R sets the fall protection trigger height for steel erection workers at fifteen feet above a lower level. This is higher than the six-foot general construction threshold because the nature of steel erection makes conventional fall protection impractical at lower heights.
45. A — Before steel erection begins, the controlling contractor must provide written notification that the concrete in footings, piers, and walls has achieved sufficient strength to support the loads imposed during steel erection. This prevents overloading immature concrete and potential structural failure.
46. C — Misaligned anchor bolts must be corrected with engineering approval before the column is erected. Field modifications such as reaming base plate holes or bending anchor bolts weaken the connection and may not meet the structural design requirements. The engineer must evaluate and approve any corrective measures.
47. D — No. 2 is the standard lumber grade for general residential and light commercial framing. It provides adequate structural values for typical wall, floor, and roof framing while being widely available and cost-effective. Higher grades (Select Structural, No. 1) offer higher allowable stresses at higher cost.
48. B — "KD" stands for kiln dried, indicating the lumber was dried in a kiln to a moisture content of nineteen percent or less at the time of surfacing. Kiln drying reduces shrinkage, warping, and checking after installation compared to air-dried or green lumber.
49. A — The IRC requires sill plate anchor bolts to be embedded a minimum of seven inches into the concrete or masonry foundation. This embedment depth ensures adequate pullout resistance to transfer uplift forces from the wood framing into the foundation.

50. D — Where floor joists meet over a bearing point, they must be lapped a minimum of three inches or butted end-to-end and connected with an approved metal splice plate. The three-inch lap allows the joists to be toenailed or connected with metal ties at the bearing point.
51. C — Wood I-joists span greater distances than comparable solid sawn joists and are more dimensionally stable because the engineered flanges and OSB web resist warping, twisting, and shrinkage. Their uniform quality and predictable performance make them the preferred choice for long-span floor framing.
52. B — LVL (Laminated Veneer Lumber) is most commonly used for beams, headers, and rim boards where high bending strength and long spans are required. The laminated veneer construction produces a member with higher allowable stresses and greater consistency than solid sawn lumber.
53. A — Precut studs are ninety-two and five-eighths inches long. When combined with a single bottom plate (1½ inches) and a double top plate (3 inches), the total wall height is ninety-seven and one-eighth inches — slightly over eight feet, which accommodates ceiling finish materials.
54. D — Headers over four-foot openings in load-bearing walls are typically built from double 2×6 or larger members set on edge with a ½-inch plywood spacer between them. The spacer brings the total header thickness to 3½ inches, matching the 2×4 wall stud depth.
55. C — The standard fastening schedule for structural panel sheathing on braced walls is six inches on center at panel edges and twelve inches on center at intermediate supports. This schedule provides the shear resistance needed for the wall to function as a braced panel.
56. A — In conventional rafter framing, the ridge board serves as an alignment and nailing surface for opposing rafters — it is not a structural beam. The ridge board simply holds the rafter tops in alignment while the ceiling joists or rafter ties at the wall plate resist the horizontal thrust.
57. B — Roof sheathing panels must be installed with the long dimension perpendicular to the rafters or truss top chords. This orientation allows each panel to span across multiple framing members, maximizing the panel's structural capacity and creating a stronger roof diaphragm.
58. D — The minimum headroom clearance for residential stairs under the IRC is six feet eight inches, measured vertically from the sloped plane of the tread nosings. This clearance must be maintained for the full length of the stairway including the landing.
59. C — Continuous rigid foam insulation installed on the exterior of the wall sheathing eliminates thermal bridging because the insulation layer is uninterrupted by framing members. Cavity insulation alone loses approximately fifteen to twenty-five percent of its effectiveness due to heat conduction through the wood studs.
60. A — R-value measures a material's resistance to conductive heat flow per unit of thickness. Higher R-values indicate greater thermal resistance. Insulation specifications are expressed in R-value because it directly quantifies the material's ability to slow heat transfer.

61. B — In Arizona's hot-dry climate, interior vapor barriers are generally not required and can be counterproductive. If moisture enters the wall assembly, an interior vapor barrier traps it inside the wall cavity, potentially causing mold growth and structural damage. The wall must be able to dry to both sides.
62. D — EPDM is a synthetic rubber membrane that can be attached by full adhesion to the substrate, mechanically fastened with concealed plate-and-screw systems, or loose-laid and held in place by ballast (river rock or concrete pavers). The attachment method is selected by the roofing designer based on the specific project conditions.
63. A — Kickout flashing is installed at the base of a roof-to-wall intersection where the roof edge meets the wall. It diverts roof runoff into the gutter rather than allowing it to flow behind the wall cladding, which is one of the most common causes of water intrusion damage in residential construction.
64. C — A four-ply BUR consists of four layers of roofing felt alternated with layers of hot asphalt. Each felt layer is set into a mopping of hot asphalt, creating a built-up waterproof membrane. The number of plies determines the redundancy and expected service life of the system.
65. B — Concrete and clay roof tiles weigh five to ten times more than asphalt shingles — typically 900 to 1,100 pounds per square versus 200 to 350 pounds for shingles. The roof structure must be designed with heavier rafters, closer spacing, or engineered trusses to support this additional weight.
66. A — Standing seam metal roofing can be installed at slopes as low as one-quarter inch per foot ($\frac{1}{4}$:12) depending on the seam type and profile. The raised interlocking seam design prevents water penetration at very low slopes, making it one of the most versatile roofing systems for slope flexibility.
67. D — A continuous air barrier must wrap the entire building envelope without gaps at transitions between walls, roofs, and foundations; at penetrations for pipes, ducts, and wiring; and at joints between different building materials. Any gap in the air barrier allows air leakage that wastes energy and can carry moisture into assemblies.
68. C — Sealant serves as a flexible gap filler that seals the final joint between properly flashed and detailed components. Sealant is never a substitute for proper flashing — it supplements the primary moisture management system by sealing small gaps that flashing alone cannot address.
69. A — The minimum net clear opening height for emergency egress windows is twenty-four inches. This height, combined with the minimum twenty-inch clear width and minimum 5.7 or 5.0 square foot area, ensures the opening is large enough for escape and firefighter entry.
70. D — A thermally broken aluminum frame has a non-conductive material (usually nylon or polyurethane) separating the interior and exterior aluminum sections. This break prevents the

highly conductive aluminum from transferring heat directly through the frame, significantly improving the window's thermal performance.

71. B — Argon gas fills the space between the panes of an insulated glazing unit and reduces convective heat transfer because argon is denser and less conductive than air. This improves the U-factor of the window assembly, reducing heat gain in summer and heat loss in winter.
72. A — Standard exterior doors are one and three-quarters inches ($1\frac{3}{4}$ ") thick. This additional thickness compared to interior doors ($1\frac{3}{8}$ ") provides greater structural strength, improved weather resistance, better insulation value, and space for weatherstripping and security hardware.
73. C — A casement window swings outward on side hinges and is operated by a crank mechanism. Casement windows provide excellent ventilation because the entire sash opens, and they seal tightly when closed because the sash presses against the frame under crank pressure.
74. B — The standard drywall screw spacing for wall applications is sixteen inches on center along each framing member. This is wider than the twelve-inch ceiling spacing because gravity does not pull wall panels away from the framing as it does with ceiling panels.
75. D — Level 5 finish with a full skim coat is required where severe lighting conditions — such as critical lighting angles from large windows or surface-mounted fixtures — would reveal imperfections through the paint. The skim coat creates a uniformly smooth surface that eliminates joint banding and fastener spotting.
76. A — The correct sequence for shower wall tile is: install cement board substrate, apply a waterproof membrane over the cement board, set tile with thinset mortar, and grout the joints. The waterproof membrane is the critical layer — tile and grout are not waterproof and water will penetrate to the substrate.
77. C — Semi-gloss paint provides excellent washability and moisture resistance, making it the preferred sheen for kitchens, bathrooms, and other high-moisture or high-traffic areas. The smooth surface resists staining and can be cleaned with soap and water without damaging the finish.
78. B — New drywall must receive a PVA (polyvinyl acetate) drywall primer before the topcoat is applied. The primer seals the porous drywall paper and joint compound, creating a uniform surface that prevents the topcoat from being absorbed unevenly — which causes visible differences in sheen between joints and field areas.
79. D — Luxury vinyl plank (LVP) flooring is waterproof in construction, meaning it resists moisture damage from spills, humidity, and wet mopping that would damage solid hardwood. This makes LVP suitable for kitchens, bathrooms, laundry rooms, and below-grade installations where hardwood is not recommended.
80. C — OSHA's "Fatal Four" causes of construction fatalities are falls, struck-by incidents, electrocution, and caught-in or caught-between incidents. These four categories account for the

majority of construction worker deaths each year. Eliminating these four hazards would save hundreds of lives annually.

81. D — OSHA requires scaffold platforms to be at least eighteen inches wide for standard work platforms. Platforms less than eighteen inches wide are permitted only when the work area is too narrow for a full-width platform, and fall protection must be provided in all cases.
82. A — A qualified person under OSHA is an individual who possesses a recognized degree, professional certificate, or extensive knowledge and experience in the subject field and can design, analyze, evaluate, and specify in that field. This differs from a competent person who can identify hazards and has authority to correct them.
83. C — Safety Data Sheets must be readily accessible to all employees at all times during their work operations. This means SDS documents must be available on the jobsite — not locked in an office or stored at a remote location. Digital access is acceptable if employees can retrieve the information immediately.
84. B — The GHS-aligned hazard communication labels must include the product identifier, hazard pictograms, signal words (Danger or Warning), hazard statements, precautionary statements, and the manufacturer's name and contact information. These six elements provide workers with essential hazard information at a glance.
85. A — Class E (Electrical) hard hats provide voltage protection up to twenty thousand volts. Class G (General) provides protection up to 2,200 volts. Class C (Conductive) provides no electrical protection. Construction workers near electrical hazards should always wear Class E hard hats.
86. D — The alternative to GFCI protection on construction sites is an Assured Equipment Grounding Conductor Program (AEGCP), which requires regular testing and inspection of all cord sets, receptacles, and equipment grounding conductors. Most contractors choose GFCI protection because it is simpler to implement.
87. B — Only the person who applied the lock is authorized to remove it. This fundamental lockout/tagout principle ensures that a worker cannot be exposed to unexpected energization by another person who removes the lock prematurely. The person applying the lock is the only one who knows whether the circuit is safe to re-energize.
88. C — Scaffold planks must extend at least six inches but not more than twelve inches beyond their end supports unless cleated or otherwise restrained. Excessive overhang creates a tipping hazard when workers step on the unsupported end of the plank.
89. A — When noise levels exceed 85 decibels as an eight-hour time-weighted average, employers must provide hearing protection — earplugs, earmuffs, or both — to exposed workers. This threshold triggers the OSHA hearing conservation program requirements including audiometric testing and training.

90. D — OSHA willful violation penalties exceed one hundred sixty thousand dollars per violation as adjusted for inflation. Willful violations — those committed with intentional disregard for the law or plain indifference to employee safety — carry the highest penalties in OSHA's enforcement structure.
91. B — Workers may enter excavations where water is accumulating only when adequate precautions are taken, which may include continuous dewatering with pumps, installation of special support systems designed for saturated conditions, or use of harnesses and lifelines. The competent person must monitor conditions continuously.
92. C — Office buildings are classified under Group B (Business) in the IBC occupancy classification system. Group B includes offices, banks, outpatient clinics, government buildings, and professional services. This classification determines the building's height, area, egress, and fire protection requirements.
93. A — The occupant load factor for a business occupancy is one hundred fifty gross square feet per person under the IBC. This means a 15,000-square-foot office floor has a calculated occupant load of one hundred persons. The factor is applied to gross floor area including corridors and other common spaces.
94. D — Fire-rated exit stairway enclosures serving four or more stories require a two-hour fire-resistance rating. Stairways serving three stories or fewer require a one-hour rating. These enclosures protect the exit path from fire and smoke to ensure safe evacuation.
95. B — The minimum design live load for standard office floor areas is fifty pounds per square foot (50 psf) under the IBC. Higher live loads are specified for heavy storage (125 psf), corridors above the first floor (80 psf), and assembly areas (100 psf).
96. C — The IBC requires a minimum of three exits for buildings with an occupant load between five hundred one and one thousand persons. Two exits are required for up to five hundred occupants, and four exits are required for more than one thousand occupants.
97. A — Type I-A construction requires a three-hour fire-resistance rating for the structural frame, including columns, girders, and trusses. This is the highest fire-resistance classification in the IBC and provides the greatest protection for high-rise and other critical structures.
98. D — Hotels, motels, and other transient lodging facilities are classified under Group R-1 in the IBC occupancy system. The "transient" designation (stays of fewer than thirty days) distinguishes R-1 from R-2 (apartments/condos) and R-3 (one- and two-family dwellings).
99. B — The required width of exit stairways is calculated by multiplying the occupant load by 0.2 inches per person. For a floor with 200 occupants, the minimum stairway width is 40 inches. For other egress components such as corridors and doors, the factor is 0.15 inches per person.

100. C — The IBC determines maximum allowable height and area by cross-referencing the building's occupancy classification (Groups A through U) and its construction type (Types I through V) in the height and area tables. These two factors are the primary determinants of how tall and how large a building may be.