PRACTICE EXAM 12 — NASCLA MARYLAND — QUESTIONS 1–55

Instructions: 55 questions total. Recommended time limit: 150 minutes. Passing threshold: 70% (39 of 55 correct). Open book — the NASCLA Maryland reference may be consulted.

1. Dimension lumber used in residential construction in the United States is generally graded:

A. Only by the contractor at the lumberyard before purchase of the materials

B. By the building inspector during the framing inspection at the construction site

C. By the homeowner's licensed professional engineer prior to use in the project

D. By certified lumber graders under the rules of recognized grading agencies

2. Engineered wood products such as laminated veneer lumber (LVL), glulam beams, and I-joists are commonly used in residential framing because they:

A. Provide more consistent strength and longer spans than comparable sawn lumber sections

B. Cost less per piece than standard dimensional sawn lumber in every available size

C. May be installed without any structural calculations or any manufacturer specifications

D. Are not subject to the limits of the residential building code's framing tables

3. Pressure-treated wood used in residential construction in Maryland is generally required when wood is:

A. Used as decorative trim inside conditioned habitable rooms of a single-family dwelling

B. Used as the structural framing for interior partition walls of a single-family dwelling

C. In direct contact with concrete, masonry, or the ground, or otherwise exposed to weather

D. Used as cabinetry, paneling, or other finished interior millwork in any new dwelling

4. A typical IRC nailing schedule for wood structural panel wall sheathing applied to studs at 16 inches on center calls for fastener spacing of:

A. Three inches on edges and three inches in the field of the sheathing panel for every panel

B. Six inches on panel edges and twelve inches in the field of the panel, with specified nails

C. One inch on panel edges and one inch in the field of the sheathing panel for every panel

D. Twelve inches on panel edges and twenty-four inches in the field, with specified nail length

5. Under the IRC, the standard spacing for wood wall studs in residential construction is generally:

A. Eight inches on center for every load-bearing wood-framed wall in a typical residence

B. Forty-eight inches on center for every load-bearing wood-framed wall in a residence

C. Thirty-six inches on center for every load-bearing wood-framed wall in a residence

D. Sixteen or twenty-four inches on center, depending on load, span, and wall type

6. Header sizing above window and door openings in a wood-framed residential wall is determined by:

A. The clear span of the opening, the load supported, and the species and grade of lumber

B. Only the width of the opening, with no consideration of the load above the header

C. The owner's preference for stained or painted finish on the exposed header surfaces

D. The brand of fasteners used to attach the framing members around the opening

7. The "slump test" performed on fresh concrete at a residential construction site primarily measures:

A. The 28-day compressive strength of the concrete cylinder after curing in a lab

B. The consistency and workability of the fresh concrete before placement in the form

C. The water-to-cement ratio of the design mix specified by the structural engineer

D. The air entrainment percentage of the concrete required for freeze-thaw resistance

8. Air-entrained concrete is generally used in exterior residential applications in Maryland because the entrained air bubbles:

A. Reduce the wet weight of the fresh concrete being placed by approximately fifty percent

B. Eliminate the need to use any reinforcing steel in concrete sidewalks and slabs

C. Provide relief space that absorbs expansion of freezing water and resists freeze-thaw damage

D. Allow the concrete to reach full design strength within twenty-four hours of placement

9. Step flashing installed at a sloped roof-to-wall intersection is typically:

A. Installed in overlapping pieces with each shingle course, woven into the wall covering

B. A single piece of metal extending the entire length of the intersection without overlap

C. Installed only after the roofing system has been completely finished and warranted

D. Used solely as an interior trim detail and not as part of the exterior weather barrier

10. Self-adhered "ice and water" underlayment along eaves of pitched residential roofs is generally required by the IRC in:

A. Climates where the average annual rainfall exceeds sixty inches per calendar year

B. Only those jurisdictions located along the Atlantic Coastal floodplain of the state

C. Hot, arid climates where summer roof temperatures exceed one hundred fifty degrees

D. Climates where there is a history of ice forming along eaves, including most of Maryland

11. Gutters and downspouts on a residential building should generally:

A. Discharge directly against the foundation wall at the base of the structure for absorption

B. Discharge water away from the foundation to prevent soil saturation and basement leakage

C. Be eliminated from any single-family dwelling located in a wooded suburban subdivision

D. Discharge only into the municipal sanitary sewer system serving the residence directly

12. A perimeter foundation drain installed against the exterior of a basement foundation wall typically:

A. Replaces the need for any waterproofing or damp-proofing membrane on the wall surface

B. Provides ventilation for indoor air quality within the basement living space of the dwelling

C. Collects water from the surrounding soil and conveys it away from the foundation to daylight or sump

D. Is required only on lots with annual rainfall exceeding eighty inches per calendar year worked

13. A sump pump installed in a residential basement typically:

A. Discharges collected groundwater out of the sump basin to a point away from the foundation

B. Provides forced air heating to the basement during winter months in cold climates

C. Filters out airborne mold spores in the basement air during the humid summer months

D. Acts as a domestic water booster pump for second-story plumbing fixtures in the dwelling

14. Under the IRC, a vented crawl space in a residential dwelling generally requires:

A. A continuous concrete slab covering the entire crawl space floor with no other treatment

B. No moisture barrier of any kind on the crawl space floor or walls in any climate condition

C. A two-inch layer of pea gravel covering the entire crawl space floor with no other materials

D. A Class I vapor retarder (such as 6-mil polyethylene) covering the exposed soil surface

15. A "conditioned" (unvented) crawl space under the IRC typically:

A. Is built only in commercial occupancies and never in single-family dwellings statewide

B. Requires the highest possible attic ventilation ratio above the dwelling for moisture balance

C. Is sealed, insulated on the perimeter walls, and provided with a continuous vapor barrier

D. Receives mechanical ventilation only from a window unit set to extract air continuously

16. Under building energy code standards, "Grade I" installation of batt insulation requires:

A. The batt to be cut shorter than the cavity opening to allow for natural air circulation

B. The batt to fill the cavity completely with no gaps, voids, or compression around obstructions

C. Two layers of batt insulation in every wall cavity regardless of the climate zone present

D. Only fiberglass material to be used as the cavity insulation in single-family dwellings

17. An air barrier and a vapor retarder serve different functions in the building envelope:

A. The air barrier stops air movement through the envelope; the vapor retarder slows diffusion of water vapor

B. The air barrier slows moisture vapor diffusion; the vapor retarder stops air movement entirely

C. Both terms refer to the exact same building product applied as a finish layer on the wall

D. Neither has any effect on energy use or moisture conditions inside the building envelope

18. A Manual J residential load calculation is used to:

A. Calculate the total federal and state income tax owed by the homeowner each year

B. Determine the homeowner's monthly mortgage payment based on amortization tables

C. Estimate construction labor productivity for the framing phase of the home project

D. Determine the design heating and cooling loads of the residence for HVAC equipment sizing

19. EPA Section 608 certification is generally required for:

A. Any worker installing residential plumbing fixtures during a home improvement project

B. Technicians who service, install, or dispose of refrigerant in stationary HVAC equipment

C. Anyone operating a portable power tool on a Maryland residential construction job site

D. Workers performing only residential framing work during new home construction projects

20. "SEER" (Seasonal Energy Efficiency Ratio) is a measure of:

A. The fuel-burning efficiency of a residential gas-fired furnace during the heating season

B. The annual operating cost of a residential water heater for any size single-family dwelling

C. The cooling efficiency of a central air conditioner or heat pump over a typical season

D. The R-value of insulation installed in the residential attic of a single-family dwelling

21. "AFUE" (Annual Fuel Utilization Efficiency) is a measure of:

A. The seasonal cooling efficiency of a central air conditioner installed in a residence

B. The total annual flow rate of water delivered by all plumbing fixtures combined in a home

C. The R-value of foam insulation installed in the attic of a single-family dwelling unit

D. The seasonal heating efficiency of a fuel-fired furnace or boiler over a heating season

22. A "WaterSense" labeled plumbing fixture is one that has been certified by the EPA to:

A. Use less water than a comparable conventional fixture while meeting performance standards

B. Filter all impurities from the municipal water supply before delivery to the fixture in use

C. Heat the incoming water using solar thermal energy alone with no other energy source

D. Soften the incoming hard water at the fixture without using any salt or other treatment

23. The temperature-and-pressure (T&P) relief valve on a residential water heater is designed to:

A. Control the maximum water temperature delivered to the fixtures within the dwelling

B. Open and release water if pressure or temperature inside the tank exceeds safe limits

C. Filter sediment out of the heated water before it reaches the home's plumbing system

D. Boost the water pressure leaving the tank to overcome any friction losses in the piping

24. A pressure-reducing valve (PRV) installed at a residential water service entrance is typically used when:

A. The municipal water pressure at the service connection is below twenty pounds per square inch

B. The home is served by a private well rather than by a municipal water system at all

C. The home uses electric resistance water heating rather than gas-fired water heating

D. The street pressure exceeds eighty pounds per square inch, which can damage plumbing fixtures

25. A backflow preventer in a plumbing system protects against:

A. Air locks in the hot water supply piping serving second-story plumbing fixtures only

B. Overheating of the water inside the residential water heater tank during peak use

C. Contamination of the potable water supply by reverse flow from a cross-connection

D. Pressure drops in the cold water supply when fixtures are operated at the same time

26. Under the NEC, the minimum working clearance in front of a residential electrical service panel rated 600 V or less is generally:

A. Thirty inches wide, thirty-six inches deep, and six and one-half feet high for safe access

B. Twelve inches wide, twelve inches deep, and four feet high above the finished floor surface

C. Eight inches wide, eight inches deep, and three feet high above the finished floor surface

D. Eighteen inches wide, twenty-four inches deep, and four feet high above the floor finish

27. Under the NEC, GFCI (ground-fault circuit-interrupter) protection is generally required for receptacles in:

A. Only the homeowner's primary bedroom and the formal living room of the dwelling

B. Bathrooms, kitchens, garages, outdoor receptacles, basements, and similar wet/damp locations

C. Only the laundry area when the laundry is located inside the kitchen of the dwelling

D. Only those receptacles that are within twelve inches of a window in the residence

28. Under recent editions of the NEC, AFCI (arc-fault circuit-interrupter) protection is generally required for branch circuits supplying:

A. Only outdoor receptacles in single-family detached dwellings located in Maryland

B. Only basement receptacles in single-family detached dwellings located in Maryland

C. Only garage receptacles in single-family detached dwellings located in Maryland

D. Most habitable rooms, including bedrooms, living rooms, dining rooms, and similar spaces

29. Tamper-resistant receptacles required by the NEC in dwelling units are designed to:

A. Prevent the insertion of foreign objects (such as a child's hairpin) into a single slot

B. Withstand higher amperage loads than ordinary receptacles in the same dwelling locations

C. Eliminate the need for GFCI protection in kitchen, bathroom, or outdoor receptacles

D. Resist all damage caused by lightning strikes to the home's electrical service entrance

30. Under IRC §R314, smoke alarms in new residential construction must generally be:

A. Battery-powered only, with no connection to the household electrical wiring or system

B. Installed only above each bedroom doorway on the corridor side at ceiling level only

C. Hardwired with battery backup and interconnected so all alarms sound when one activates

D. Connected directly to the local fire department's central monitoring station automatically

31. Under IRC §R315, carbon monoxide alarms must generally be installed:

A. Only inside the room containing the residence's primary fuel-burning appliance directly

B. Outside each separate sleeping area in the immediate vicinity of the bedrooms

C. Only on the lowest occupied story of the residence regardless of bedroom location

D. Inside every closet of every habitable room with a sleeping function in the dwelling

32. Under the IRC, the wall separating an attached garage from a dwelling must generally be:

A. Constructed with not less than 1/2-inch gypsum board (with 5/8-inch Type X to any habitable rooms above)

B. Constructed only of solid masonry block at least eight inches thick with no openings or penetrations

C. Built only of plywood sheathing applied directly to the studs without any gypsum board covering

D. Eliminated entirely if the homeowner agrees to a one-page liability waiver at the closing of sale

33. Under the IRC, fireblocking and draftstopping are required at concealed wall, floor, and ceiling spaces to:

A. Reduce the dwelling's heating and cooling energy use during the summer season only

B. Provide additional structural support to the floor and ceiling framing of the dwelling

C. Reduce the transmission of sound between adjacent rooms in a single-family dwelling

D. Limit the spread of fire and smoke through hidden cavities in the building structure

34. NFPA 13D is the standard governing automatic sprinkler systems installed in:

A. High-rise commercial office buildings exceeding seventy-five feet in height for fire safety

B. Industrial warehouses storing hazardous materials such as flammable liquids and gases

C. One- and two-family dwellings and manufactured homes for life safety and property protection

D. Public assembly occupancies such as theaters, churches, and similar structures with large occupant loads

35. Under IRC §R311, the minimum width of a residential stairway (above the handrail) is generally:

A. Twenty-four inches measured from the wall finish to the stairway face opposite the wall

B. Thirty-six inches measured at and above the handrail height required by the IRC stair section

C. Forty-eight inches measured from the wall finish to the stairway face opposite the wall

D. Sixty inches measured from the wall finish to the stairway face opposite the wall

36. Under IRC §R311, the minimum headroom required over a residential stairway is generally:

A. Five feet measured from the nose of the tread to the underside of the floor framing above

B. Six feet measured from the nose of the tread to the underside of the floor framing above

C. Seven feet measured from the nose of the tread to the underside of the floor framing above

D. Six feet eight inches measured from the tread nose to the underside of the floor above

37. Under IRC §R311, a stairway landing at the top and bottom must generally be:

A. At least as wide as the stair and at least 36 inches measured in the direction of travel

B. At least twelve inches wide and twelve inches in the direction of travel without exception

C. Eliminated entirely whenever the stair has fewer than ten risers in the total run

D. Built only of solid concrete in residential applications, with no wood framing allowed

38. Under accessibility standards (ICC A117.1 / ADA), a ramp serving an accessible route generally has a maximum running slope of:

A. One unit vertical in four units horizontal (1:4) for any accessible ramp design

B. One unit vertical in eight units horizontal (1:8) for any accessible ramp design

C. One unit vertical in twelve units horizontal (1:12) with limited length between landings

D. One unit vertical in twenty units horizontal (1:20) regardless of any landing requirements

39. Under accessibility standards (ICC A117.1 / ADA), a doorway in an accessible route must generally provide a minimum clear opening width of:

A. Twenty-four inches measured at the narrowest point of the doorway between any obstructions

B. Thirty-two inches between the door face and the stop with the door open ninety degrees

C. Twenty-eight inches measured at the narrowest point of the doorway between any obstructions

D. Twenty inches measured at the narrowest point of the doorway between any obstructions

40. Maryland's Accessibility Code (MAC) and federal ADA accessibility regulations both reference the standard published as:

A. ASTM E-241 Accessible Design Standard for Multi-Family and Mixed-Use Buildings

B. ASHRAE 90.1 Energy Standard for Buildings Except Low-Rise Residential

C. NFPA 70 National Electrical Code as published by the National Fire Protection Association

D. ICC A117.1 Accessible and Usable Buildings and Facilities (Standard for Accessible Design)

41. Under ICC A117.1, grab bars at an accessible water closet (toilet) are typically:

A. Installed on the side wall and rear wall at a height of 33 to 36 inches above the floor

B. Installed only on the rear wall behind the water closet at a height of 60 inches above the floor

C. Installed only at the front of the water closet at a height of 18 inches above the floor

D. Optional in any accessible bathroom, since grab bars are recommended only as a courtesy

42. Under ICC A117.1, the minimum maneuvering clearance on the pull side of a door, hinge side approach, is generally:

A. Six inches by six inches measured outside the door frame on the pull side of the door

B. Twelve inches by twelve inches measured outside the door frame on the pull side of the door

C. 60 inches deep by 36 inches beyond the latch side, large enough to accommodate the door swing

D. Eighteen inches by eighteen inches measured outside the door frame on the pull side

43. Under ICC A117.1, the standard accessible reach range for an unobstructed forward or side reach is generally:

A. From the floor level to a maximum of seventy-two inches above the finished floor surface

B. From fifteen inches above the floor to forty-eight inches above the floor as the maximum

C. From thirty-six inches above the floor to seventy-two inches above the floor as the maximum

D. From eighteen inches above the floor to thirty-six inches above the floor as the maximum

44. Accessible door hardware required under ICC A117.1 generally:

A. Operates without tight grasping, pinching, or twisting of the wrist (e.g., lever or push/pull hardware)

B. Requires the user to grip the knob firmly and turn it more than ninety degrees to operate

C. Includes a deadbolt that may only be operated using a small pinch-type thumb-turn lock

D. Includes a sliding chain lock at chest height with a minimum tension force of twenty pounds

45. A "percolation test" performed during septic system design in Maryland measures:

A. The compressive strength of the soil at the proposed building foundation location

B. The bearing capacity of the soil for use in concrete foundation design calculations

C. The pH and mineral content of the well water serving the proposed residential lot

D. The rate at which water absorbs into the soil at the proposed drain field location

46. Permits for on-site sewage disposal (septic) systems in Maryland are generally issued by:

A. The Maryland State Department of Assessments and Taxation through SDAT regional offices

B. The Maryland Public Service Commission utility-permitting division in Baltimore directly

C. The local county health department, which conducts soil evaluations and inspects installations

D. The U.S. Environmental Protection Agency's wastewater section in Region 3 directly

47. Maryland's Bay Restoration Fund (BRF) "flush fee" is generally assessed:

A. On the purchase of any new residential construction materials in any Maryland county

B. On septic system permits and on water/sewer bills, to fund Bay-related wastewater upgrades

C. On every Maryland resident's federal income tax return filed for the calendar year

D. On the contractor's MHIC license renewal fee paid biennially to the Commission staff

48. Private well water in a Maryland residential property is generally required to be tested for:

A. Bacteria and other parameters at the time of well construction, with periodic testing recommended

B. Lead only, with no testing required for any other water-quality parameter at any time

C. Arsenic only, with no testing required for any other water-quality parameter at any time

D. Color and taste only, with no laboratory testing performed at any point during ownership

49. A geotechnical investigation performed before residential foundation design typically:

A. Measures only the elevation of the property's existing topographic high and low points

B. Calculates the property's fair market value for use in real estate appraisal of the lot

C. Determines the homeowner association's covenants applicable to the lot under development

D. Determines the soil bearing capacity, groundwater conditions, and recommended foundation type

50. A chemical termite barrier ("soil treatment") applied during new residential construction in Maryland:

A. Is applied only to the exterior siding of the dwelling after framing is complete

B. Is applied to the soil around and beneath the foundation by a licensed pest control applicator

C. Replaces the requirement for any structural inspection or annual pest control treatment

D. Is required only if the property is located within ten feet of a designated wetland

51. Borate-treated wood used in residential construction provides:

A. Increased structural strength compared to standard untreated dimensional lumber framing

B. Improved fire resistance equivalent to a one-hour fire-rated wall assembly when used alone

C. Resistance to wood-destroying insects and decay fungi where the wood remains dry in service

D. A decorative finish that does not require any paint, stain, or other surface treatment

52. Closed-cell spray polyurethane foam (SPF) insulation, compared to open-cell SPF:

A. Has a higher R-value per inch and also functions as an air and vapor retarder when properly installed

B. Has a much lower R-value per inch and provides no air-sealing or vapor-control benefit

C. Is less expensive per board foot in every installation and is the only foam permitted in Maryland

D. Is used only for soundproofing in residential construction and has no thermal value at all

53. Rigid foam board insulation (XPS, EPS, polyiso) is commonly used in residential construction at:

A. The interior face of finished interior partition walls only, never on exterior assemblies

B. Surface treatments on roof shingles to add additional R-value to the existing roof system

C. Only as a temporary insulation product, with all foam board removed before any final inspection

D. Foundation walls, beneath slabs, and on exterior wall sheathing as continuous insulation

54. The National Fire Protection Association's NFPA 70, the National Electrical Code, is:

A. A voluntary federal recommendation that has no legal force in any state of the U.S.

B. Adopted by reference, with state amendments, as the basis for electrical work in most U.S. jurisdictions

C. Replaced by a Maryland-specific code unrelated to any model electrical code or standard

D. Limited in application to commercial buildings and not used in residential electrical wiring

55. A fire-rated door assembly used in a fire-rated wall is generally specified by:

A. Color and finish only, with no reference to the door's fire-resistance rating at all

B. The brand name of the door manufacturer only, with no reference to a specific rating

C. The fire-protection rating in minutes (e.g., 20-, 45-, 60-, 90-minute), matching the wall assembly

D. The R-value of the foam core insulation inside the door slab regardless of rating type

PRACTICE EXAM 12 — NASCLA MARYLAND — EXPLAINED ANSWER KEY

1. D — Dimension lumber sold in the U.S. is graded by certified lumber graders following the rules of recognized agencies such as the Southern Pine Inspection Bureau, the West Coast Lumber Inspection Bureau, or NeLMA. The grade stamp on each piece tells the framer the species, mill, grade, and moisture content, which determines allowable spans under the IRC framing tables.

2. A — LVL, glulam, and I-joists are engineered from smaller wood elements bonded with structural adhesives, producing members that have far more consistent strength values and span capabilities than sawn lumber of the same nominal size. The engineered consistency allows longer floor and roof spans without intermediate bearing.

3. C — The IRC requires preservative-treated wood whenever wood is in direct contact with concrete, masonry, or the ground, or otherwise exposed to weather where decay or insect attack is likely. Untreated wood in those locations rots and invites termites, and substituting it is a common code violation.

4. B — A typical IRC nailing schedule for wood structural panel wall sheathing fastens the panel with nails at 6 inches on center along the panel edges and 12 inches on center in the field. The schedule transmits shear forces between sheathing and studs and is essential for the wall's lateral resistance.

5. D — IRC framing tables provide for wood studs at 16 inches on center as the standard residential wall framing, with 24-inch on-center spacing allowed for certain loads and stud sizes (typically 2x6 walls). Tighter spacing supports heavier loads and longer wall heights.

6. A — Header size above a window or door opening depends on the clear span of the opening, the load supported (roof only, floor only, or roof plus floor), and the species and grade of lumber used. The IRC includes prescriptive header span tables for common species and configurations.

7. B — The slump test measures the consistency and workability of fresh concrete by dropping a slumped cone of the mix and measuring how far it sags. The test is a quick field check that the delivered mix matches the design and is workable for placement.

8. C — Air-entrained concrete contains millions of microscopic air bubbles that act as relief chambers when water in the concrete freezes and expands, preventing the internal pressure that causes freeze-thaw spalling. The treatment is essential for exterior flatwork, foundations, and footings in Maryland's freeze-thaw climate.

9. A — Step flashing is installed in individual L-shaped pieces, one piece for each course of shingles at a roof-to-wall intersection, with the pieces woven into the shingle layup and behind the wall covering. The lap pattern keeps water moving down and out, away from the wall.

10. D — IRC §R905.1.2 requires self-adhered ice barrier underlayment along eaves in regions where there is a history of ice forming along the eaves and causing backup of water into the structure. Most of Maryland is covered by the requirement under jurisdictional amendments.

11. B — Gutters and downspouts must discharge away from the foundation — typically through extensions, splash blocks, or pipes — to keep soil dry and prevent water from following the wall down to the footing. Discharging directly at the foundation is a leading cause of basement leakage and settlement.

12. C — A perimeter foundation drain collects water moving through the surrounding soil and conveys it away from the wall, either to daylight downhill or to a sump from which it is pumped out. The drain works together with damp-proofing or waterproofing on the wall to keep basements dry.

13. A — A sump pump in a basement sits in a sump basin that collects groundwater from the perimeter drain system and pumps it out through a discharge line to a point well away from the foundation. Without the discharge, the basin would fill and the basement would flood.

14. D — In a vented crawl space, IRC §R408 requires a Class I vapor retarder (typically 6-mil polyethylene) covering the exposed earth, with seams lapped and sealed and the material extended up the walls. The barrier prevents soil moisture from entering the crawl space and condensing on framing.

15. C — An unvented (conditioned) crawl space is sealed at the wall vents, insulated on the perimeter foundation walls rather than at the floor above, and provided with a continuous vapor barrier covering the floor and lapping up the walls. The space is then treated as part of the building thermal envelope.

16. B — A "Grade I" insulation installation fills the cavity completely with no gaps, voids, compression, or missed spaces around obstructions, wiring, and plumbing. The grade matters because installation quality dominates effective R-value, and only Grade I delivers the nominal labeled value.

17. A — An air barrier stops bulk air movement through the envelope, while a vapor retarder slows the diffusion of water vapor through materials; they perform different physical jobs and may be different products in the same assembly. Confusing the two leads to moisture problems and energy losses.

18. D — A Manual J load calculation, published by ACCA, determines the design heating and cooling loads of a residence based on envelope characteristics, climate, internal gains, and infiltration, so that HVAC equipment is sized correctly. Oversizing wastes energy and shortens equipment life; undersizing leaves the home uncomfortable.

19. B — EPA Section 608 of the Clean Air Act requires technicians who service, install, repair, or dispose of stationary appliances containing certain refrigerants to be certified for the proper refrigerant type they handle. Improper handling vents ozone-depleting and high-GWP gases to the atmosphere.

20. C — SEER is the seasonal energy efficiency ratio that measures the cooling efficiency of central air conditioners and heat pumps as cooling output divided by electrical energy input over a typical cooling season. Higher SEER means more cooling for the same electricity.

21. D — AFUE is the seasonal heating efficiency of fuel-fired furnaces and boilers, expressed as the percentage of fuel energy converted to useful heat over a typical heating season. Modern condensing equipment can reach 90-plus percent AFUE.

22. A — A WaterSense label means EPA has certified that a fixture uses at least 20 percent less water than the federal standard while still meeting performance requirements. The label appears on toilets, faucets, showerheads, irrigation controllers, and similar products.

23. B — The T&P relief valve is a safety device that opens to release water from the tank if pressure exceeds about 150 psi or temperature exceeds about 210 °F, preventing the tank from exploding due to overheating or over-pressure. A blocked or missing T&P discharge is a serious safety hazard.

24. D — When incoming street pressure exceeds about 80 psi, the IPC and IRC require installation of a pressure-reducing valve to lower the residential service pressure to a safe range, typically below 80 psi. Excessive pressure damages fixtures, supply piping, and water heaters.

25. C — A backflow preventer protects the potable water supply from contamination caused by reverse flow at a cross-connection (for example, a hose left submerged in a chemical solution). The IPC requires backflow protection at every cross-connection of the public water system to a private system.

26. A — NEC Table 110.26(A)(1) requires working space in front of energized electrical equipment of at least 30 inches wide (or the equipment width, whichever is greater), 36 inches deep for systems 600 V or less, and 6½ feet high. The clearance lets a worker stand, open the panel, and step back safely.

27. B — NEC §210.8 requires GFCI protection for receptacles in bathrooms, kitchens, garages, outdoor locations, basements, laundry areas, and other wet or damp locations. GFCIs cut power within milliseconds of a ground fault, preventing shock injuries.

28. D — NEC §210.12 requires AFCI protection for branch circuits supplying outlets in most habitable rooms — bedrooms, living rooms, family rooms, dining rooms, hallways, closets, and similar spaces. AFCIs detect arcing faults in damaged wiring before they ignite a fire.

29. A — Tamper-resistant receptacles use spring-loaded internal shutters that block insertion unless both blades of a plug are inserted simultaneously, preventing children from inserting a single foreign object (hairpin, paper clip, key) into one slot. NEC §406.12 requires TR receptacles in dwelling units.

30. C — IRC §R314 requires smoke alarms in new dwellings to be hardwired to the building electrical system, equipped with battery backup, and interconnected so that activation of any single alarm sounds all alarms throughout the dwelling. The interconnection ensures occupants hear an alarm regardless of their location.

31. B — IRC §R315 requires carbon monoxide alarms outside each separate sleeping area in the immediate vicinity of the bedrooms, with additional CO alarms required in dwellings that contain fuel-burning appliances or attached garages. The placement aims to wake sleeping occupants before CO reaches dangerous levels.

32. A — IRC §R302.6 requires the wall between an attached garage and the dwelling to be separated by at least 1/2-inch gypsum board on the garage side, with 5/8-inch Type X gypsum board required on common walls and ceilings between the garage and habitable rooms above. The separation slows fire spread from the garage into the dwelling.

33. D — IRC §R302.11 requires fireblocking at concealed wall and ceiling spaces and §R302.12 requires draftstopping in large concealed spaces (such as drop ceilings or floor cavities) to limit the passage of fire and smoke through hidden cavities of the building. Without these stops, fire can spread rapidly through framed voids.

34. C — NFPA 13D is the sprinkler standard for one- and two-family dwellings and manufactured homes, balancing life safety against cost and complexity in residential occupancies. NFPA 13R covers low-rise residential occupancies, and NFPA 13 covers general commercial and high-rise applications.

35. B — IRC §R311.7.1 requires residential stairways to be at least 36 inches wide above the handrail height; with one handrail installed, the clear width between the handrail and the opposite wall must be at least 31½ inches. The width supports safe two-way passage and egress.

36. D — IRC §R311.7.2 requires a minimum headroom of 6 feet 8 inches measured vertically from the sloped plane of the tread nosings to the underside of the floor or ceiling framing above. The clearance prevents head impact during stair use.

37. A — IRC §R311.7.6 requires a landing at the top and bottom of each stairway, with the landing at least as wide as the stair and not less than 36 inches measured in the direction of travel. The landing gives users a stable platform to start and finish a stair run.

38. C — Under ICC A117.1 and the ADA Standards for Accessible Design, an accessible ramp may have a maximum running slope of 1:12 (one inch of rise per twelve inches of run), with a maximum 30-inch rise between landings and landings at least 60 inches long. Anything steeper is treated as a stair, not a ramp.

39. B — ICC A117.1 and the ADA Standards require a minimum 32-inch clear opening width at accessible doorways, measured between the face of the door and the stop with the door open 90 degrees. The clearance accommodates wheelchair passage through the opening.

40. D — Maryland's Accessibility Code and federal ADA accessibility regulations both reference ICC A117.1 (Accessible and Usable Buildings and Facilities), which provides the detailed technical criteria — dimensions, clearances, and reach ranges — for accessible design. The 2010 ADA Standards reference an earlier ICC A117.1 edition.

41. A — ICC A117.1 requires grab bars at an accessible water closet on the side wall (42 inches long) and the rear wall (24 to 36 inches long), mounted with the centerline 33 to 36 inches above the finished floor. The grab bars support transfer from a wheelchair to the toilet and back.

42. C — At a door, ICC A117.1 requires a clear maneuvering space on the pull side of the door, hinge approach, of at least 60 inches measured perpendicular to the door and 36 inches measured beyond the latch side of the door. The space lets a wheelchair user position to grasp the latch and pull the door open.

43. B — ICC A117.1 sets the accessible reach range for an unobstructed forward or side reach between 15 inches minimum and 48 inches maximum above the finished floor. Controls and operable parts within that range can be used by a person seated in a wheelchair.

44. A — ICC A117.1 requires accessible door hardware to be operable with one hand and without tight grasping, pinching, or twisting of the wrist — making lever handles, push/pull plates, and U-shaped pulls the standard solutions. Round door knobs that require twisting are not accessible.

45. D — A percolation test measures the rate at which water absorbs into the soil at the proposed location of a septic drain field, expressed in minutes per inch of fall. The rate determines whether the soil is suitable for a conventional septic system and how large the drain field must be sized.

46. C — In Maryland, on-site sewage disposal (septic) systems are permitted by the local county health department under MDE regulations. The health department conducts the soil evaluation and percolation testing, reviews the design, and inspects the installation.

47. B — Maryland's Bay Restoration Fund is funded by a "flush fee" assessed on water and sewer bills and on septic system permits. The funds support upgrades of wastewater treatment plants and septic systems to reduce nutrient loading to the Chesapeake Bay.

48. A — A private well serving a Maryland residential property is generally required to be tested for bacteria (total coliform and E. coli) and other parameters at the time of well construction, with periodic follow-up testing recommended by MDE and the county health department. The testing protects occupants from waterborne illness and detects emerging contamination.

49. D — A geotechnical investigation involves field exploration (typically borings) and laboratory testing to determine the soil's bearing capacity, groundwater conditions, and the foundation type best suited to the site. The recommendations drive footing design, dewatering plans, and slope stability work.

50. B — A chemical termite ("pre-treat") barrier is applied to the soil around and beneath the foundation by a Maryland-licensed pest control applicator before the foundation is sealed, creating a treated zone that termites must cross to reach the structure. The licensure ensures proper chemical handling and worker protection.

51. C — Borate-treated wood resists wood-destroying insects and decay fungi as long as the wood remains protected from prolonged wetting that would leach out the water-soluble borates. The treatment is well suited to framing in conditioned interior spaces where the wood will stay dry.

52. A — Closed-cell spray polyurethane foam offers a higher R-value per inch (about R-6 to R-7) than open-cell foam (about R-3.5 per inch) and, when properly installed at sufficient thickness, also functions as an air barrier and a vapor retarder. The higher cost is offset by combined thermal, air, and vapor performance.

53. D — Rigid foam board (XPS, EPS, or polyiso) is commonly installed on the exterior of foundation walls, beneath concrete slabs, and as continuous insulation on the outside of wall sheathing to break thermal bridges through the framing. Continuous insulation is essential to meeting modern IECC envelope requirements.

54. B — NFPA 70 (the National Electrical Code) is adopted by reference, with state-specific amendments, by Maryland and almost every U.S. jurisdiction as the standard for electrical installations. The three-year revision cycle keeps the code current with new equipment and safety practices.

55. C — A fire-rated door assembly is specified by its fire-protection rating in minutes — typically 20, 45, 60, 90, or 180 minutes — matching the rating of the wall in which it is installed (a 60-minute door in a 1-hour wall, for example). The label on the door identifies the rating, manufacturer, and listing agency.