PRACTICE EXAM 18: ISA CERTIFIED ARBORIST SIMULATION

QUESTIONS 1–200

Time limit: 3 hours 30 minutes. Each question has exactly one correct answer.

1. The most direct result of the vascular cambium dividing throughout a growing season is:

A. Extension of the shoot tip in length each day

B. Production of new xylem inward and new phloem outward

C. Shedding of the outer protective bark layer

D. Formation of new flowers on mature branches

2. When a girdling wire severs the phloem of a young tree, the eventual consequence is:

A. Immediate wilting of all foliage within hours

B. Increased photosynthesis in the upper canopy

C. Activation of nitrogen fixation within root cells

D. Gradual root starvation from blocked sugar transport

3. The effect of transpiration at the leaf surface on water movement through xylem is:

A. Generation of tension that pulls water upward in columns

B. Active metabolic pumping of water into xylem vessels

C. Osmotic reversal forcing water downward to the roots

D. Complete cessation of all water flow through the stem

4. When stomata close during drought stress, the immediate outcome is:

A. Acceleration of root growth deeper into the soil

B. Increased respiration by leaves in full sunlight

C. Simultaneous reduction of transpiration and photosynthesis

D. Release of stored starch into the phloem vessels

5. Heavy spring defoliation of a temperate tree results in:

A. An immediate boost to carbohydrate reserves

B. Severe stress because reserves are already depleted

C. Improved structural strength of remaining branches

D. Permanent dormancy for the following several seasons

6. Prolonged soil waterlogging around a tree's root zone produces:

A. Stronger root anchorage against wind loads

B. Increased oxygen availability to the root hairs

C. Higher cation exchange capacity in saturated soil

D. Root suffocation from loss of oxygen in soil pores

7. The structural result of repeated wind flexing on a young unstaked tree is:

A. A thinner trunk with reduced taper at the base

B. Complete failure at the first major storm event

C. Greater trunk taper and reaction wood development

D. Delayed canopy expansion until the fifth season

8. Removal of the terminal shoot tip on a young tree leads to:

A. Release of lateral buds from auxin suppression

B. Complete cessation of lateral branching for one year

C. Production of new terminal wood from the pith directly

D. Immediate death of the remaining scaffold branches

9. The outcome of proper branch collar preservation during pruning is:

A. Heartwood regeneration around the wound site

B. Complete elimination of decay organisms from the tree

C. Permanent structural weakness at the cut location

D. Successful Wall 4 formation by the cambium at the margin

10. When mycorrhizal fungi colonize tree roots, the result is:

A. Fixation of atmospheric nitrogen directly in root cells

B. Dramatic expansion of the effective absorbing surface area

C. Production of antibiotics that kill all soil pathogens

D. Complete elimination of the tree's need for root hairs

11. The direct physiological consequence of wound closure around a pruning cut is:

A. Formation of new wood and callus tissue around the wound

B. Regeneration of the damaged section back to original form

C. Replacement of the lost bark with a thicker protective layer

D. Complete removal of the wound surface from the trunk

12. An extended period of low light conditions on a shade-intolerant species results in:

A. Immediate leaf shedding to conserve plant resources

B. Increased stomatal opening throughout the canopy

C. Reduced photosynthesis and gradual decline of the tree

D. Accelerated cambial division producing denser wood

13. The biological effect of starch reserves stored in parenchyma cells is:

A. Direct conduction of water upward through the trunk

B. Structural support for the heaviest scaffold branches

C. Production of new chlorophyll in expanding leaves

D. Providing energy for refoliation, wound response, and growth

14. When a xylem vessel becomes blocked by an air embolism, the local result is:

A. Increased water flow through neighboring vessels

B. Loss of water-conducting capacity in that vessel

C. Formation of a new xylem vessel in the same position

D. Complete shutdown of the entire tree's hydraulic system

15. The long-term result of severe soil compaction within a root zone is:

A. Gradual decline from reduced oxygen and water uptake

B. Immediate improvement in structural stability of the tree

C. Rapid production of new absorbing roots at the surface

D. Complete protection of the roots from all pathogens

16. The direct consequence of a tree's annual growth ring formation is:

A. Seasonal shedding of the innermost heartwood layer

B. Complete replacement of all bark layers each year

C. Addition of a new layer of xylem to the trunk's diameter

D. Removal of the previous year's phloem from the cambium

17. When a tree forms heartwood at the center of its trunk, the functional result is:

A. Continuous water conduction through the inner cylinder

B. Structural support with decay resistance from extractives

C. Active storage of starch reserves for the following year

D. Production of new growth rings toward the pith center

18. The effect of low soil oxygen on tree root respiration is:

A. Reduced cellular energy and impaired nutrient uptake

B. Accelerated root growth in response to stress signals

C. Increased resistance to all soil-borne pathogens

D. Improved ability to absorb deep subsoil water

19. Heavy autumn leaf drop in a deciduous tree results in:

A. Immediate refoliation before the first winter frost

B. Complete loss of the tree's carbohydrate reserves

C. Active transport of nitrogen from roots to empty branches

D. Translocation of nutrients from leaves to storage before drop

20. When a latent bud is triggered to grow after the loss of a nearby branch, the result is:

A. Production of only flowers with no vegetative tissue

B. Death of all other latent buds on the same branch

C. Formation of an epicormic sprout from the dormant bud

D. Immediate regeneration of the lost branch in full form

21. A tree producing reaction wood in response to a persistent lean will develop:

A. Wood with altered structure that helps correct the lean

B. Normal uniform wood with no adaptive response

C. Progressively weaker wood at the base of the lean

D. Complete death of cambial tissue on the leaning side

22. The direct consequence of a tree losing 50 percent of its live canopy in a storm is:

A. Immediate growth of replacement foliage within one week

B. Complete survival with no measurable stress response

C. Significant reduction in photosynthesis and carbohydrate production

D. Increased structural strength of the remaining scaffold limbs

23. A leaf arrangement with leaves borne in pairs directly across from each other at each node results in identification as:

A. Alternate leaf arrangement typical of oaks and hickories

B. Opposite leaf arrangement typical of MAD Horse genera

C. Whorled leaf arrangement typical of bedstraw species

D. Spiral leaf arrangement typical of cycads and palms

24. When identifying a tree with rounded leaf lobes and acorns maturing in a single season, the result places it in:

A. The red oak group of the genus *Quercus*

B. The hickory genus *Carya* in eastern forests

C. The beech genus *Fagus* of temperate forests

D. The white oak group of the genus *Quercus*

25. A tree with pointed bristle-tipped leaf lobes and acorns maturing over two growing seasons is classified as:

A. A red oak within the genus *Quercus*

B. A white oak within the genus *Quercus*

C. A hickory within the genus *Carya*

D. An ash within the genus *Fraxinus*

26. A conifer that sheds all its needles each autumn will most likely belong to:

A. The pine genus *Pinus* with evergreen needles

B. The hemlock genus *Tsuga* with flat needles

C. The bald cypress genus *Taxodium* that drops needles

D. The red cedar genus *Juniperus* with scale leaves

27. Correctly writing the scientific name of red maple requires:

A. All capital letters with bold formatting

B. All lowercase letters without italics

C. Capital letters only on the species epithet

D. *Acer rubrum* with genus capitalized and italicized

28. A plant label reading *Acer rubrum* 'October Glory' indicates that the name in single quotes identifies:

A. A wild botanical variety from a natural population

B. A cultivar selected and propagated clonally

C. The formal subspecies under botanical code

D. The common nursery marketing name only

29. Identifying a tree with palmately compound leaves of five leaflets, opposite arrangement, and upright white flower spikes leads to:

A. White ash in the olive family

B. Black walnut in the walnut family

C. Horse chestnut in the soapberry family

D. Pignut hickory in the walnut family

30. A tree with mottled tan and white peeling bark and broad palmate simple leaves will most likely be identified as:

A. American sycamore in the plane family

B. Sugar maple in the soapberry family

C. Red oak in the beech family

D. Norway maple introduced from Europe

31. Applying the MAD Horse mnemonic to tree identification results in recognizing genera with:

A. Palmately compound arranged leaves exclusively

B. Opposite leaf arrangement including maple, ash, dogwood, horse chestnut

C. Deciduous needles that shed each autumn

D. Distinctive peeling bark patterns at maturity

32. A compound leaf with leaflets arranged along two sides of a central rachis is classified as:

A. A simple lobed leaf like sugar maple

B. A palmately compound leaf like horse chestnut

C. A whorled leaf arrangement at the nodes

D. A pinnately compound leaf like ash or walnut

33. A compound leaf with leaflets radiating from a single attachment point is classified as:

A. A palmately compound leaf like horse chestnut

B. A pinnately compound leaf like ash or walnut

C. A simple leaf with deeply cut lobes

D. A whorled leaf arrangement typical of many herbs

34. A species reaching 70 feet at maturity planted beneath a 30-foot distribution line results in:

A. A proper application of Right Tree, Right Place

B. A safe planting with no future utility conflict

C. An eventual conflict with the overhead conductors

D. Compliance with most municipal planting ordinances

35. A mature height safely under 20 feet allows planting beneath a 25-foot distribution line, demonstrating:

A. A violation of the 10-20-30 diversity rule

B. A conflict with standard ANSI A300 practices

C. Non-compliance with municipal codes in most cities

D. Proper application of the Right Tree, Right Place principle

36. The *Fraxinus* (ash) genus belongs to which plant family?

A. Pinaceae, the pine family with resinous needles

B. Oleaceae, the olive family with opposite leaves

C. Sapindaceae, the soapberry family with maples

D. Rosaceae, the rose family with apples and pears

37. Planting 40 percent of a landscape with a single genus results in:

A. A violation of the 20 percent genus limit under the rule

B. Full compliance with the 10-20-30 diversity rule

C. Compliance with all ANSI A300 pruning standards

D. The preferred approach for monoculture street plantings

38. Tree of heaven (*Ailanthus altissima*) is correctly classified in eastern North America as:

A. A federally endangered native species

B. A protected understory native species

C. A non-native invasive species spreading aggressively

D. An evergreen conifer with deciduous needles

39. Identification of a tree during winter depends primarily on:

A. Leaf venation and margin characteristics alone

B. Bud shape, twig features, and bark character

C. Flower color from the previous summer

D. Fruit present on the lowest branches only

40. A native species from eastern North America suitable for urban planting would be:

A. Tree of heaven introduced from Asia

B. Norway maple introduced from Europe

C. Callery pear originally from east Asia

D. Eastern redbud native to eastern states

41. A soil with balanced proportions of sand, silt, and clay is classified as:

A. Pure clay with dominant fine particles

B. Pure sand with dominant coarse grains

C. Pure organic matter without mineral content

D. Loam, the ideal texture for most tree species

42. A soil pH reading of 7.0 on the pH scale corresponds to:

A. A strongly acidic soil near the lower limit

B. The neutral midpoint between acidic and alkaline

C. A moderately alkaline reading above neutral

D. A reading entirely off the standard scale

43. A bulk density reading of 1.8 g/cm³ in mineral soil produces:

A. Severe compaction that halts most root growth

B. Ideal conditions for root expansion and aeration

C. High cation exchange capacity in the upper horizon

D. Improved drainage through the entire profile

44. An ideal mineral soil contains approximately:

A. 10 percent pore space by volume

B. 25 percent pore space by volume

C. 50 percent pore space by volume

D. 90 percent pore space by volume

45. Composite soil sampling across an area results in:

A. A single-point analysis of one exact location

B. Averaged variation across the sampled site

C. Higher laboratory fees for sample processing

D. Less accurate results than a single grab sample

46. A perc test showing 36 hours of drain time in a planting site indicates:

A. Ideal drainage for any tree species available

B. Excessive drainage that dries roots rapidly

C. Soil composed entirely of coarse sand grains

D. Drainage inadequate for most tree species

47. Continuous addition of organic matter to clay soil over years results in:

A. Gradual improvement of structure and pore space

B. A permanent change in the soil's fundamental texture

C. Complete conversion to a sandy loam over time

D. Lower cation exchange capacity in the upper horizon

48. Interveinal chlorosis on new pin oak leaves growing in soil at pH 7.9 indicates:

A. Excess nitrogen from nearby lawn fertilizer

B. Potassium toxicity suppressing magnesium uptake

C. Iron deficiency caused by high soil pH

D. Calcium toxicity from previous lime application

49. A proper landscape mulch ring for a newly planted tree should be installed at:

A. Two to four inches deep with the trunk kept clear

B. Eight to ten inches piled against the trunk

C. A thin dusting less than half an inch deep

D. Plastic sheeting topped with decorative stones

50. The effect of soil compaction on tree root function is:

A. Increased oxygen delivery to the deepest roots

B. Enhanced drainage through the upper profile

C. Improved anchorage against windthrow loading

D. Reduced pore space and oxygen starvation of roots

51. Cation exchange capacity in a sandy soil with low organic matter is typically:

A. Very high, retaining all applied fertilizer

B. Low, allowing cation nutrients to leach readily

C. Identical to that of a clay-rich soil

D. Unrelated to clay or organic matter content

52. Most of a mature tree's absorbing roots are found at what depth?

A. Below 4 feet in the subsoil horizons

B. Only within a deep central taproot

C. In the upper 12 to 18 inches of soil

D. Exclusively within the heartwood zone

53. A soil pH of 4.5 measured in a landscape bed represents:

A. Strongly acidic conditions below the neutral value

B. Moderately alkaline conditions above neutral

C. The exact neutral midpoint of the pH scale

D. A reading entirely outside the standard range

54. Applying elemental sulfur to a high-pH soil results in:

A. Raising the pH toward alkaline values

B. Complete sterilization of the soil profile

C. No measurable effect on the soil chemistry

D. Gradual lowering of pH through microbial oxidation

55. A planting hole dug to two to three times the diameter of the root ball results in:

A. Insufficient room for any root expansion

B. Excessive labor cost with no planting benefit

C. A zone of loosened soil for outward root growth

D. A perched water table beneath the root ball

56. Setting a newly planted tree with the root flare at or slightly above grade results in:

A. Immediate girdling root formation at the trunk

B. Preserved flare tissue and reduced long-term decline

C. Complete exposure of the root system to drying air

D. Required irrigation twice daily for establishment

57. Using the unamended native soil as backfill for a planting hole leads to:

A. Slower establishment than with heavy amendment

B. Pot-bound conditions in the ground over time

C. Immediate nutrient deficiency in the root zone

D. Better long-term root expansion into surrounding soil

58. A planted 4-inch caliper tree will require approximately how many growing seasons to establish?

A. Four growing seasons at one per caliper inch

B. One growing season regardless of the caliper

C. Ten growing seasons regardless of the caliper

D. Six months with adequate irrigation only

59. Staking a young tree rigidly for three years produces:

A. Stronger trunk taper with greater structural wood

B. A thinner trunk with reduced taper and weak structure

C. Faster establishment than any unstaked tree

D. Complete protection from all storm damage events

60. A circling root left uncorrected at container planting produces:

A. Stronger anchorage from the permanent root position

B. Beneficial nitrogen fixation at the trunk base

C. A permanent defect that eventually girdles the trunk

D. Rapid breakdown of the root within one year

61. Cutting and removing at least the upper portion of a wire basket at planting results in:

A. Complete loss of root ball structural integrity

B. Required replacement of the basket with plastic mesh

C. Elimination of potential girdling by the wire

D. Violation of current nursery stock standards

62. Supporting a B&B root ball from underneath during lifting produces:

A. Preservation of the trunk-to-root connection

B. Immediate separation of trunk from root ball

C. Damage to the fine absorbing roots at the base

D. Complete ball failure before reaching the hole

63. Removing all twine tied around a B&B trunk at planting prevents:

A. Proper settling of the root ball in the hole

B. Adequate root ball support during establishment

C. Nursery stock damage during transport to the site

D. Eventual girdling of the trunk as the tree grows

64. Keeping a newly planted root ball consistently moist but not saturated during establishment results in:

A. Rapid desiccation of the expanding new root system

B. Adequate water without suffocating the root ball

C. Permanently waterlogged conditions below the ball

D. Guaranteed transplant failure within the first month

65. Skipping fertilization during the first growing season after planting produces:

A. Avoidance of forced growth exceeding root capacity

B. Certain death of the newly planted tree

C. Violation of current ANSI A300 pruning standards

D. Required weekly foliar nutrient sprays to compensate

66. Transplanting during dormancy in late fall or early spring results in:

A. Higher risk than mid-summer transplanting work

B. Complete loss of the entire tree at all times

C. Reduced stress because the tree is not actively transpiring

D. Immediate leaf-out within two days of planting

67. Performing advance root pruning one growing season before a tree move produces:

A. A smaller root ball with reduced survival

B. New fibrous roots inside the future ball line

C. Complete root system loss before the actual move

D. Guaranteed failure of the transplant process

68. A 3-inch caliper tree that fails to leaf out the spring after planting most likely experienced:

A. Normal winter dormancy still in progress

B. Inadequate mulch depth at the trunk base

C. Cold air damage to the dormant buds only

D. Root ball desiccation during handling or planting

69. A container tree with its root flare buried 6 inches below the final grade will show:

A. Gradual decline as the buried flare decays over years

B. Faster establishment than a properly planted specimen

C. Stronger trunk taper from the deeper soil contact

D. Increased nitrogen uptake at the buried zone

70. A planting hole dug to the exact diameter of the root ball results in:

A. Ideal conditions for outward root expansion

B. Faster establishment than a wider hole

C. No zone of loosened soil for new roots to expand into

D. Improved anchorage against the first wind event

71. Proper inspection of a newly delivered nursery tree before planting should focus on:

A. The brand name printed on the container label

B. The exact weight on the delivery manifest

C. The width of the wire basket holding the ball

D. Trunk, crown, root flare, and root ball condition

72. Removing temporary stakes within one growing season after planting produces:

A. Immediate tree failure during the next wind event

B. Natural wind flexing that develops trunk taper

C. Complete loss of the tree's root anchorage

D. Requirement for permanent cabling instead

73. A pruning cut placed just outside the branch collar and bark ridge produces:

A. Complete removal of the Wall 4 cambium layer

B. Immediate flush regrowth at the cut surface

C. Preserved collar cambium capable of forming Wall 4

D. Permanent decay entry directly into the trunk

74. Topping a mature shade tree results in:

A. Large wounds, depleted reserves, and weakly attached sprouts

B. Improved structural stability of the canopy

C. Compliance with standard ANSI A300 practices

D. Guaranteed extension of the tree's useful life

75. Using the three-cut method on a heavy branch during removal prevents:

A. Any decay from entering the remaining stub

B. Bark from tearing downward along the trunk

C. The need to disinfect the pruning tools

D. Formation of callus tissue at the wound margin

76. The selective removal of dead, dying, diseased, broken, and weakly attached branches is the pruning objective known as:

A. Raising for pedestrian clearance beneath

B. Reducing for overall height control

C. Restoration after previous storm damage

D. Cleaning, the most common routine objective

77. A reduction cut made back to a lateral large enough to assume the terminal role results in:

A. Natural-looking crown reduction with proper wound response

B. An arbitrary stub with no directional control

C. Complete loss of all future growth on the branch

D. Required application of wound dressing each time

78. Applying structural pruning during the juvenile growth phase of a tree results in:

A. Immediate death of the central leader shoot

B. Irreversible damage to the developing canopy

C. Small corrective cuts that prevent larger wounds later

D. No measurable benefit compared to mature pruning

79. Removing more than 25 percent of a mature tree's live foliage in one session results in:

A. A healthier tree with reduced stress load

B. Depleted reserves and weakly attached epicormic sprouts

C. Compliance with ANSI A300 mature tree guidelines

D. Stronger wind resistance through reduced sail area

80. A properly placed cut outside the branch bark ridge leads to:

A. Removal of the branch collar and Wall 4 tissue

B. An arbitrary stub projecting beyond the trunk

C. Permanent decay entry into the sapwood core

D. Successful wound closure through Wall 4 formation

81. A flush cut against the parent stem results in:

A. Removal of the branch collar and loss of Wall 4 cambium

B. Improved wound closure compared to proper cuts

C. Stronger structural wood at the wound site

D. Faster callus formation than any other cut

82. A stub cut projecting beyond the branch collar results in:

A. Faster decomposition than a proper cut

B. Stronger wound response at the branch base

C. Immediate callus formation over the stub wood

D. Dead wood that cannot be compartmentalized and invites decay

83. Using bypass pruning blades on living wood up to one inch in diameter produces:

A. Crushed stem tissue from the anvil pressure

B. Torn bark along the cut surface of the wood

C. Clean cuts without crushing the stem tissue

D. Slower cutting than anvil-style blades alone

84. Using a pole pruner is most appropriate when the result is needed on:

A. Large branches over six inches in diameter overhead

B. Small branches out of reach without climbing

C. Cuts on the main trunk of a mature tree

D. Felling small trees on flat ground safely

85. A request to remove 50 percent of a mature tree's live foliage results in:

A. Proper application of ANSI A300 guidelines

B. Standard maintenance pruning at the expected level

C. Compliance with the 10-20-30 diversity rule

D. A request that violates accepted pruning standards

86. Correcting codominant stems early while the tree is young results in:

A. Small cuts and strong future structural form

B. Large wounds that cannot compartmentalize properly

C. Immediate failure of the remaining scaffold branches

D. Required removal of the entire tree from the site

87. Lower branch removal for vertical clearance beneath a canopy is the pruning objective known as:

A. Cleaning to remove dead branches

B. Reducing to lower the overall crown height

C. Raising to provide vertical clearance

D. Restoring after previous storm damage

88. Disinfecting pruning tools between cuts is most important when the work involves:

A. Routine cleaning pruning on healthy specimens

B. Pruning trees with contagious vascular diseases

C. Any use of bypass hand pruners on small twigs

D. Removal of dead wood from a dormant tree

89. Writing a professional pruning specification including objective, scope, and standards results in:

A. Clear expectations for the work and protection for all parties

B. Unnecessary paperwork that delays the project

C. Violation of ANSI A300 documentation standards

D. Reduced legal protection for the arborist on site

90. Removing a dead branch from a mature tree falls under which pruning objective?

A. Reducing the overall crown height gradually

B. Raising for pedestrian clearance beneath

C. Restoring after previous storm damage events

D. Cleaning to remove dead and weak branches

91. The single most important factor determining whether a pruning wound closes successfully is:

A. The brand of cutting tool used on the job

B. Cut placement relative to the branch collar

C. The weather conditions during the operation

D. The time of day when the cut is made

92. Using the three-cut method for a heavy branch results in:

A. A longer cutting time compared to a single cut

B. A larger wound than a single-cut approach

C. Prevention of bark tearing along the trunk

D. Complete elimination of any future decay

93. Pruning oaks during dormancy in oak wilt regions results in:

A. Accelerated wound closure from cold temperatures

B. Increased attraction of sap-feeding beetle vectors

C. Guaranteed fungal contamination of all wound sites

D. Reduced risk of disease transmission through fresh wounds

94. Lion-tailing, or stripping interior foliage and concentrating weight at branch ends, produces:

A. Weaker branches more prone to failure in wind

B. Stronger branches with improved structural form

C. Compliance with accepted ANSI A300 practices

D. Faster wound closure at the cut surfaces

95. Pollarding requires beginning at specific framework points when the tree is young and results in:

A. A one-time pruning with no future maintenance

B. A form applicable to any mature tree at any time

C. A long-term management system with repeated cuts on schedule

D. Immediate elimination of all future pruning needs

96. Restoration pruning after topping or severe damage produces:

A. Immediate return of the original canopy form

B. Gradual development of acceptable structure from sprouts

C. Complete removal of all epicormic sprouts at once

D. Permanent elimination of all wound-response tissue

97. Subordination of a competing stem in favor of a dominant leader results in:

A. Reduced growth of the subordinated stem without removal

B. Complete removal of the entire competing stem at the base

C. Elimination of all lateral branching on the main leader

D. Heading back of every branch to uniform length

98. Applying wound dressing to a pruning cut, according to current research, produces:

A. Significantly accelerated wound closure in all species

B. Complete elimination of any decay organism entry

C. Required compliance with current ANSI A300 standards

D. Minimal benefit and sometimes slower compartmentalization

99. A pruning cut made at the exact midpoint of a branch length results in:

A. A proper reduction cut to an appropriate lateral

B. A heading cut leaving an arbitrary stub regardless of laterals

C. Correct cleaning of dead wood from the canopy

D. Proper application of the three-cut method

100. The most beneficial time for structural pruning on a shade tree is during:

A. The final decade of mature life

B. The first month after planting

C. The juvenile growth phase while cuts are small

D. Every autumn after leaf fall annually

101. The first step in diagnosing an unhealthy tree should produce:

A. Immediate application of broad-spectrum fungicide

B. Removal of the tree as a precautionary measure

C. Laboratory analysis of a wood core sample

D. Identification of the species and its normal characteristics

102. Finding a fungal fruiting body on a tree trunk during inspection results in:

A. Identification of a beneficial mycorrhizal partnership

B. A sign indicating active decay within the tree

C. Evidence of normal seasonal bark shedding only

D. A symptom of excess nitrogen fertilization at the root

103. Observing wilting and yellowing on a tree's leaves represents:

A. Symptoms, or the tree's response to a problem

B. Signs, or direct evidence of the causal agent

C. Laboratory confirmations of a specific pathogen

D. Direct identification of a bark beetle population

104. A pest that can successfully attack and kill healthy vigorous trees on its own is classified as:

A. A saprophyte limited to dead tissue only

B. A secondary pest requiring prior host stress

C. A primary pest capable of attacking healthy trees

D. A beneficial predator of other forest insects

105. The direct result of emerald ash borer infestation on healthy ash trees is:

A. Complete recovery within a single growing season

B. Improved wood quality in the remaining trunk

C. No measurable effect on tree health or survival

D. Canopy decline and death regardless of tree size

106. Implementing Integrated Pest Management in a landscape produces:

A. A decision framework using monitoring, thresholds, and tactics

B. A total ban on all pesticide use in the landscape

C. Use of only biological control agents by the applicator

D. A specific brand of organic pesticide formulation

107. Fire blight caused by *Erwinia amylovora* affects which plant family?

A. Pinaceae, including pines and firs

B. Rosaceae, including apples and pears

C. Sapindaceae, including maples and buckeyes

D. Fagaceae, including oaks and beeches

108. The primary mechanisms of oak wilt spread between adjacent oaks are:

A. Wind dispersal of spores and airborne mites

B. Soil nematodes and rain splash from leaves

C. Root grafts and sap-feeding beetles at fresh wounds

D. Direct contact between touching leaves only

109. Interveinal chlorosis on new leaves of a pin oak in alkaline soil indicates:

A. Nitrogen deficiency from lawn competition

B. Excess potassium suppressing magnesium

C. Sulfur excess from industrial pollution sources

D. Iron deficiency caused by high soil pH

110. Yellowing that begins on older inner leaves and progresses outward indicates deficiency of:

A. Nitrogen, a mobile macronutrient

B. Iron, an immobile micronutrient

C. Calcium, a structural secondary nutrient

D. Boron, a trace element for cell division

111. Cupping and twisting of new growth on a mature tree most likely indicates:

A. An active spider mite outbreak in the canopy

B. Normal seasonal fall color development

C. Phenoxy herbicide drift or residual exposure

D. Drought stress during a dry summer period

112. Delayed decline of a tree three years after nearby construction most likely results from:

A. A new invasive insect pest in the region

B. Construction root damage with exhausted reserves

C. Normal aging unrelated to the construction event

D. Reduced rainfall during the previous dormant period

113. Anthracnose on a sycamore tree is best classified as:

A. A fungal leaf disease producing spots and blotches

B. A systemic bacterial wilt of the vascular system

C. A viral disease transmitted by leafhoppers

D. A nutrient disorder limited to young foliage only

114. Finding white mycelial sheets beneath the bark of a declining tree confirms:

A. Fire blight caused by a bacterial pathogen

B. Dutch elm disease in the xylem vessels

C. Oak wilt from sap-feeding beetle vectors

D. Armillaria root rot established beneath the bark

115. Dutch elm disease is spread from tree to tree primarily by:

A. Wind dispersing spores across long distances

B. Elm bark beetles and root grafts between trees

C. Soil nematodes feeding on elm fine roots

D. Rain splash from infected foliage in storms

116. Trunk injection of a systemic insecticide is most appropriate for:

A. High-value trees threatened by bark or wood borers

B. Treatment of weeds in the surrounding lawn area

C. Control of fungal leaf diseases in the canopy

D. Fertilization of newly planted nursery stock

117. The phrase "the label is the law" applied to pesticide use means that labels are:

A. Advisory guidelines that may be followed when convenient

B. Expired one year after the product is first opened

C. Legally enforceable federal documents for applicators

D. Binding only during the first application cycle

118. When a diagnosed disease has no effective treatment available, the correct professional response is:

A. Applying experimental treatments without owner consent

B. Recommending removal of all nearby trees as a precaution

C. Refusing to discuss the finding with the property owner

D. Communicating honestly and recommending appropriate management

119. Calculating the Critical Root Zone of a 24-inch DBH oak using the standard formula produces:

A. A radius of 12 feet from the trunk outward

B. A radius of 24 feet from the trunk outward

C. A radius of 6 feet from the trunk outward

D. A radius of 48 feet from the trunk outward

120. Placing tree protection fencing at the CRZ boundary or further out results in:

A. Protection of the majority of the absorbing root system

B. Required removal of all trees on the construction site

C. Compliance with ANSI A300 pruning standards

D. Reduction of the tree's mature height by half

121. Concrete washout occurring inside a Tree Protection Zone leads to:

A. Improved drainage across the affected root zone

B. Stronger bark formation at the trunk base

C. Root death from the high pH of the washwater

D. Faster establishment of new absorbing roots

122. Raising the soil grade 12 inches over an existing tree's root zone produces:

A. Improved drainage throughout the root system

B. Gradual decline as buried roots lose oxygen access

C. Stronger anchorage during major storm events

D. Immediate tree death within a few hours

123. Using directional boring to install a utility across a mature tree's root zone results in:

A. The greatest possible root damage on site

B. Compaction of soil throughout the protection zone

C. Severed roots along the entire bore line

D. Installation beneath the root zone with minimal disturbance

124. Storing construction materials inside a Tree Protection Zone produces:

A. Soil compaction and root damage from the weight

B. Improved root zone protection from weather

C. Compliance with current construction standards

D. Required exemption from ANSI Z133 safety rules

125. Performing a pre-construction tree assessment before final design produces:

A. A document used only for final billing

B. Complete elimination of any future monitoring need

C. Findings that can influence project decisions

D. Satisfaction of all regulatory requirements automatically

126. Making clean root cuts with sharp tools before excavation produces:

A. Tearing and crushing of the remaining roots

B. Required application of wound sealant to every cut

C. Delayed assessment until after excavation is complete

D. Better wound responses than from unprepared tearing

127. Effective post-construction care for a damaged tree includes:

A. Aggressive crown reduction to balance root loss

B. Deep watering, mulching, and multi-year monitoring

C. Heavy nitrogen fertilization to force rapid growth

D. Immediate trunk injection with a broad fungicide

128. Using the dripline alone as a tree protection boundary results in:

A. Exposure of most absorbing roots that extend beyond the dripline

B. Complete protection of the entire actual root system

C. Compliance with all ISA Best Management Practices

D. A boundary preferred over the calculated CRZ formula

129. Delayed decline following construction damage typically appears:

A. Within hours of the damaging activity ending

B. Only during the next major drought cycle

C. Months to several years after the triggering event

D. Always on the exact anniversary of the construction

130. Specifying sturdy, visible, and maintained tree protection fencing results in:

A. Easily movable boundaries that crews can adjust

B. A symbolic marker with no real protective function

C. A decorative element that matches nearby buildings

D. A durable boundary preserved throughout construction

131. Excluding all activity from the root zone of a mature tree during construction produces:

A. The most effective protection against root damage

B. Unnecessary restriction that delays every project

C. A practice prohibited by construction safety codes

D. The same outcome as allowing limited equipment access

132. Lowering the soil grade 6 inches around a mature tree results in:

A. Improved nutrient access in the newly exposed layers

B. Direct loss of functional roots with the removed soil

C. Stronger anchorage during future wind storms

D. Better drainage benefits across the root zone

133. Preparing a baseline tree condition report before construction results in:

A. Satisfaction of every regulatory requirement

B. Complete elimination of any later monitoring

C. A document useful only for client billing

D. Documentation of pre-existing conditions for later comparison

134. A tree showing no visible symptoms one year after construction should be:

A. Assumed fully recovered and ignored from that point

B. Removed immediately as a safety precaution

C. Monitored for several more seasons for delayed decline

D. Treated with aggressive nitrogen fertilization

135. Using hand or air excavation within a Tree Protection Zone produces:

A. Identification and preservation of roots during the work

B. The fastest possible excavation speed on site

C. The lowest labor cost compared to other methods

D. Complete severance of all roots in the affected area

136. A tree that has contacted an energized overhead power line during construction should be:

A. Approached immediately for pruning by any worker

B. Treated as potentially energized until the utility confirms otherwise

C. Sprayed with water to dissipate the electrical charge

D. Removed quickly before the contact is reported

137. The formal definition of "risk" in tree risk assessment combines:

A. The age of the tree and its total height in feet

B. The market value and replacement cost of the tree

C. The likelihood of failure and severity of consequences

D. The visible defects and the species of the tree alone

138. A Level 1 tree risk assessment produces:

A. Advanced instrumentation results from sonic tomography

B. Detailed single-tree inspection with probe and mallet

C. Laboratory analysis of collected wood core samples

D. Rapid limited visual screening of many trees

139. A Level 2 tree risk assessment involves:

A. Detailed visual inspection of an individual tree

B. Rapid drive-by screening of hundreds of street trees

C. Only laboratory analysis of collected samples

D. Theoretical models based solely on the species

140. A Level 3 tree risk assessment uses:

A. Standard measuring tape and ground observation only

B. Advanced instrumentation like resistograph and tomography

C. Drive-by photography from a moving vehicle

D. Only a small mallet for sounding the trunk

141. Codominant stems with included bark result in:

A. The strongest possible structural union between stems

B. Beneficial chemical signals attracting mycorrhizal partners

C. A structurally weak union because trapped bark prevents strength

D. An improved center of gravity for the mature tree

142. Finding a shelf fungus growing from a mature trunk leads to:

A. Confirmation that active decay exists within the tree

B. Identification of a beneficial mycorrhizal partnership

C. Evidence of normal seasonal bark shedding only

D. A symptom of recent nitrogen over-fertilization

143. A target in tree risk assessment is defined as:

A. A specific branch identified for pruning removal

B. An area of decay visible from outside the trunk

C. A zone where the tree is expected to fall

D. Any person, property, or activity affected by failure

144. Target occupancy rate measures:

A. The age of structures beneath the tree canopy

B. The frequency and duration of target presence in the strike zone

C. The total dollar value of nearby real estate parcels

D. The number of trees per acre of land surveyed

145. Observing a new lean in an upright tree with fresh soil cracking on the opposite side indicates:

A. A cosmetic change with no structural meaning

B. Normal phototropic growth toward available sunlight

C. Root plate movement and elevated uprooting risk

D. Seasonal soil movement unrelated to the tree

146. Sounding a trunk with a mallet during inspection produces:

A. Detection of hollow areas through changes in sound

B. Measurement of the nitrogen content of the wood

C. Species identification from the sound alone

D. Location of all overwintering insects in the bark

147. The TRAQ risk matrix combines which two dimensions to produce a risk rating?

A. Tree species and trunk diameter at breast height

B. Property value and the tree's age in years

C. Site drainage and measured soil pH at the trunk

D. Likelihood of failure and impact with consequences

148. A "probable" likelihood of failure in TRAQ indicates failure is:

A. Already imminent or clearly about to occur

B. Likely to occur during the assessment period

C. Unlikely but theoretically still possible

D. Impossible under any foreseeable conditions

149. The "severe" consequence level in TRAQ applies to failures producing:

A. Catastrophic damage, serious injury, or death

B. Minor property damage easily repaired at low cost

C. Moderate damage with no significant injury

D. No measurable effect on any nearby targets

150. A tree with an internal cavity may still be structurally sound if:

A. The cavity drains water quickly after every storm

B. The cavity is smaller than four inches across

C. Sufficient intact wood remains around the perimeter

D. The cavity is located above six feet from grade

151. Consequences of failure in tree risk assessment depend on:

A. Only the total calendar age of the tree

B. The size of the part, fall height, and target nature

C. Only the weight of the largest scaffold branch

D. Only the distance to the nearest paved road

152. Residual risk in tree risk assessment refers to:

A. Insurance premium costs on the property

B. Risk visible only after tree removal has occurred

C. Risk present during mitigation work itself

D. Risk that remains after mitigation has been implemented

153. A professional tree risk assessment report should include:

A. Scope, defects, targets, mitigation, and residual risk

B. Only removal recommendations for every tree examined

C. Only the photographs of the site with no narrative

D. Only a billing statement for the assessment work

154. Installing cabling and bracing on a codominant union produces:

A. Complete elimination of all structural risk

B. Required annual removal of all scaffold branches

C. Reduction of risk without complete elimination

D. Compliance with all ANSI A300 mature tree requirements

155. Communicating risk findings to a property owner should use:

A. Highly technical jargon to demonstrate credibility

B. Pressure tactics to recommend the most expensive option

C. Withholding uncertain information to avoid worry

D. Plain language and respect for the owner's decisions

156. Root defects are difficult to evaluate during risk assessment because roots:

A. Always heal spontaneously without any intervention

B. Are below ground and not directly observable

C. Produce no above-ground symptoms at any time

D. Are only present in young recently planted trees

157. A healthy rounded callus surrounding an old small wound represents:

A. Evidence of successful compartmentalization rather than a defect

B. An active cavity requiring immediate removal

C. A major structural defect indicating imminent failure

D. A sign of hidden decay beneath the bark surface

158. Reduction pruning on a moderate-risk overextended branch produces:

A. Complete elimination of all structural risk

B. A requirement to remove the entire tree instead

C. Decreased end weight and reduced failure likelihood

D. Heading back of every branch to uniform length

159. The principal safety standard for arboricultural operations in the United States is:

A. ANSI A300 covering pruning practices

B. ANSI Z133 covering arboricultural safety

C. ANSI Z60.1 covering nursery stock standards

D. OSHA 29 CFR 1926 for general construction only

160. The minimum approach distance for an unqualified worker to an energized distribution line below 50 kV is:

A. Three feet from the conductor

B. Five feet from the conductor

C. Twenty-five feet from the conductor

D. Ten feet from the conductor

161. A qualified line-clearance arborist differs from an unqualified worker by having:

A. Only a personal set of rubber insulating gloves

B. Specialized training in electrical hazards and line work

C. Only a current bucket-truck operator license

D. Only general landscape maintenance experience

162. A climbing helmet for tree work must include which feature beyond a standard hard hat?

A. A wide brim for sun protection overhead

B. Reflective tape on every exterior surface

C. A chin strap to retain the helmet during climbing

D. An open face design for peripheral vision

163. Chainsaw-resistant leg protection works by:

A. Containing fibers that clog the chain on contact

B. Activating an electromagnetic brake on the saw

C. Reflecting the moving chain away from skin

D. Producing an audible warning tone to the operator

164. OSHA requires hearing protection when noise exceeds:

A. 30 decibels of normal conversation

B. 50 decibels of quiet outdoor activity

C. 120 decibels of extreme machinery only

D. 85 decibels of typical chainsaw operation

165. A proper pre-work job briefing should cover:

A. Only the names of crew members on site

B. Work scope, hazards, PPE, and emergency procedures

C. Only the lunch break schedule for the crew

D. Only the pricing of the day's planned work

166. ANSI Z133 requires aerial rescue capability on a climbing crew:

A. For essentially all climbing operations with a crew

B. Only when trees over 100 feet are involved

C. Only when electrical hazards are present

D. Only on weekends when EMS is delayed

167. Suspension trauma develops when a climber remains motionless in a harness because:

A. Climbing ropes deteriorate from prolonged body heat

B. Harness buckles corrode from sweat over time

C. Blood pools in the legs and reduces venous return

D. The helmet restricts blood flow to the head

168. The kickback zone of a chainsaw is located at:

A. The rear handle near the throttle control

B. The bottom edge of the bar during cutting

C. The middle of the bar during straight cutting

D. The upper portion of the chainsaw bar tip

169. The chain brake on a chainsaw is designed to:

A. Reduce engine vibration transmitted to hands

B. Stop the chain when kickback or manual action activates it

C. Prevent engine flooding during cold starts

D. Slow the chain to idle during normal work

170. The proper left-hand grip on a chainsaw is:

A. Thumb wrapped fully around the front handle

B. Only fingertip contact for quick release

C. Loose palm contact to absorb engine vibration

D. Thumb tucked alongside the handle only

171. Two-handed chainsaw operation is:

A. Optional based on operator preference and skill

B. Required only for felling very large trees

C. The standard practice for nearly all saw use

D. Reserved only for cuts above the operator's head

172. Top-handle chainsaws are designed specifically for:

A. Cutting residential firewood at ground level

B. Bucking large logs from a standing position

C. Felling full-sized mature forest trees only

D. Climbing arborist use up in the canopy

173. The chain catcher on a chainsaw is designed to:

A. Catch the chain if it breaks or derails during cutting

B. Sharpen the chain automatically during use

C. Lubricate the chain during extended cuts

D. Secure the chain only during transport

174. The working load limit on rigging equipment is commonly calculated as:

A. Half of the rated tensile strength

B. One-tenth of the rated tensile strength

C. Nine-tenths of the rated tensile strength

D. Exactly equal to the rated tensile strength

175. Shock loading in rigging occurs when:

A. A rope is lifted slowly against a steady load

B. Electrical current builds up in a dry rope

C. A steady static weight is hung from the rope

D. A falling piece is suddenly caught by the rigging system

176. Using a friction device such as a Port-a-Wrap during rigging results in:

A. Increased peak forces during every catch

B. Complete elimination of shock loading in rigging

C. Controlled slip that distributes the catch energy

D. Required replacement after every cut piece

177. A rigging block that redirects a load over an anchor experiences:

A. Approximately twice the force of the load itself

B. Exactly half the force of the load itself

C. Precisely the force of the load itself alone

D. No additional force when properly installed

178. The hinge in a standard felling cut functions to:

A. Be cut completely through before the tree begins falling

B. Control fall direction as the tree commits to the fall

C. Replace the need for a proper notch cut from the front

D. Substitute for an escape route during the operation

179. A planned escape route during felling should:

A. Lead directly beneath the expected fall line

B. Be improvised at the moment the tree begins to fall

C. Always run exactly straight behind the feller

D. Be planned and cleared before cutting begins

180. Barber chair in tree felling refers to:

A. A resting position between difficult cuts

B. A specialty chain for softwood species only

C. Vertical trunk splitting during the back cut

D. A decorative form left in the stump base

181. Chipper operators should feed branches into the infeed:

A. Butt end first while standing to the side

B. Tip first while standing directly behind

C. Wearing loose clothing for quick release

D. Only during evening hours to avoid heat

182. Aerial lift operators near energized lines must maintain approach distance with:

A. Only the bucket at the outermost reach

B. Both the bucket and the boom of the lift

C. Only the rubber tires on the ground below

D. Only the hydraulic cylinders of the machine

183. Personal protective equipment should be inspected:

A. Only during annual company safety reviews

B. Only after a known impact or failure

C. Only by the original equipment manufacturer

D. Before every use with damaged items retired

184. The ANSI Z133 minimum tensile strength for an arboricultural climbing rope is approximately:

A. 1,800 pounds for residential climbing only

B. 3,000 pounds for routine maintenance work

C. 5,400 pounds per the current standard

D. 10,000 pounds for any climbing operation

185. A properly tied friction hitch should:

A. Lock rigidly and never move under any load

B. Grip reliably while permitting controlled adjustment

C. Be replaced after every single climb day

D. Slip continuously to allow rapid descent

186. The feed control bar on a wood chipper is designed to:

A. Stop the feed rollers in an emergency situation

B. Indicate the speed of the chipping drum

C. Meter lubricant to the feed roller bearings

D. Switch the chipper between forward and reverse

187. When refueling a chainsaw, the operator should first:

A. Refuel quickly without removing the fuel cap

B. Keep the saw at low idle during the process

C. Refuel while still wearing cut-resistant gloves

D. Stop the saw and allow it to cool briefly

188. A worksite first aid kit should be:

A. Stored in a vehicle parked off the worksite

B. Carried only by the designated safety officer

C. Available on site and stocked appropriately

D. Limited to over-the-counter medications only

189. Urban trees reduce the urban heat island effect through:

A. Releasing methane gas into the atmosphere

B. Shading surfaces and providing evapotranspiration cooling

C. Absorbing heat through root systems underground

D. Reflecting sunlight from every waxy leaf surface

190. A complete tree inventory records:

A. Every tree within the defined inventory area

B. Only trees scheduled for immediate removal

C. Only a statistical sample of the total population

D. Only trees with visible structural defects

191. The i-Tree suite of analytical tools was developed to help communities:

A. Identify tree species from photographs alone

B. Predict which specific trees will fail in storms

C. Estimate the dollar value of ecosystem services

D. Determine the genetic makeup of urban forests

192. The trunk formula method of plant appraisal applies when:

A. The tree has no visible defects of any kind

B. A replacement tree of identical size exists

C. The tree is a recently planted nursery specimen

D. The tree is too large to replace with nursery stock

193. A typical tree protection ordinance in a municipality:

A. Bans all pruning by private property owners

B. Requires permits for removal of protected trees

C. Requires mandatory removal of mature trees

D. Applies only to trees planted by the city itself

194. Canopy cover goals for a community are typically expressed as:

A. The percentage of land area covered by canopy

B. The number of trees per square mile of city

C. The total leaf biomass produced annually

D. The average street tree height in feet

195. A Tree City USA community must maintain a minimum forestry budget of:

A. Ten dollars per capita annually

B. Fifty dollars per capita annually

C. Two dollars per capita annually

D. One hundred dollars per capita annually

196. Species rating in plant appraisal reflects:

A. The lumber market value of the species

B. The exact calendar age of the tree

C. The current height of the tree in feet

D. The desirability and suitability in the local area

197. Effective communication with property owners about tree work should use:

A. Plain language and respect for owner decisions

B. Highly technical jargon to display expertise

C. Pressure tactics to close the sale quickly

D. Refusal to provide any pricing estimates

198. Multiple studies have documented which social benefit of urban trees?

A. Increased crime rates in wooded neighborhoods

B. Improved mental health and reduced stress for residents

C. Higher rates of asthma across all age groups

D. Reduced physical activity among nearby residents

199. The most persuasive argument for canopy expansion before a budget-focused council is:

A. The aesthetic preferences of forestry staff

B. The mayor's personal favorite tree species

C. The documented dollar value of ecosystem services

D. The simplicity of installing artificial turf instead

200. Street trees planted following the 10-20-30 rule primarily protect against:

A. High nursery stock prices over time

B. Uneven growth rates across the city

C. High property taxes on private lots

D. Catastrophic pest-driven canopy loss

PRACTICE EXAM 18 — ANSWER KEY AND EXPLANATIONS

1. B — The vascular cambium divides inward to produce new xylem and outward to produce new phloem, thickening the trunk each year. Heartwood, bark, and pith do not produce new wood. The cambium is the engine of secondary growth.

2. D — A girdling wire severs the phloem, interrupting downward sugar transport from leaves to roots. The roots gradually starve and lose function, followed by the rest of the tree. Xylem flow continues above the girdle until root failure cascades upward.

3. A — Transpiration at the leaf surface generates tension that pulls water upward through xylem in continuous columns held together by hydrogen bonding. No metabolic pumping is required from the tree itself. This is the cohesion-tension mechanism of water transport.

4. C — Closing stomata simultaneously reduces transpiration (water loss) and photosynthesis (because CO_2 can no longer enter). This trade-off between water conservation and carbon gain is the central constraint on tree function under heat or drought stress.

5. B — Reserves reach their lowest point in late spring after refoliation has consumed stored sugars but before new leaves have repaid the investment. Spring defoliation during this window is particularly devastating. Reserves rebuild through summer.

6. D — Waterlogged soil eliminates the large pore space that normally holds air, starving roots of oxygen needed for respiration. Roots that cannot respire cannot absorb water or nutrients. This is the primary mechanism by which poor drainage kills trees.

7. C — Wind flexing stimulates the cambium to produce reaction wood and develop greater trunk taper at the base. Rigidly staked trees lose this stimulus and develop weaker trunks. Naturally flexed trees build strength through mechanical stress.

8. A — Auxin produced at the shoot tip travels downward and suppresses the growth of lateral buds below. Removing the leader interrupts this suppression and releases lateral buds to grow. This is the biological basis for many pruning responses.

9. D — Preserving the branch collar during pruning preserves the cambium that forms Wall 4 at the wound margin. Wall 4 is the strongest of the four CODIT walls. Flush cuts destroy this tissue and prevent proper compartmentalization.

10. B — Mycorrhizal fungi colonize tree roots and extend hyphae outward into the surrounding soil, dramatically increasing the effective absorbing surface area. The tree supplies sugars; the fungus supplies access to water and nutrients from a much larger soil volume.

11. A — Wound closure produces new wood and callus tissue forming a ring around the original injury. Trees do not regenerate damaged wood — they wall it off with internal barriers. This is fundamentally different from mammalian wound healing.

12. C — Low light reduces photosynthesis below the level needed to meet respiration and growth demands, leading to gradual decline. Shade-intolerant species cannot sustain themselves below a minimum light threshold. The result is progressive weakening.

13. D — Starch reserves stored in parenchyma cells fuel refoliation, wound response, and growth during periods when photosynthesis cannot meet demand. Reserves are essential for recovery from defoliation, drought, and pruning. Reserves peak in autumn and bottom out in late spring.

14. B — An air embolism in a xylem vessel breaks the continuous water column and blocks conduction in that vessel. The affected vessel cannot be restored within that growing season. Water then moves through neighboring intact vessels.

15. A — Soil compaction reduces pore space and oxygen, gradually starving roots of the gas exchange they need for respiration. Roots that cannot respire cannot absorb water or nutrients. Decline develops over months to years.

16. C — Annual growth ring formation adds a new layer of xylem to the trunk through cambial activity each growing season. This is how trees thicken their diameter. Heartwood, bark, and pith do not add new growth.

17. B — Heartwood provides structural support and resists decay through extractives (tannins, resins) deposited in the dead cell walls. It no longer conducts water. Sapwood, by contrast, is the outer functional xylem.

18. A — Low oxygen impairs root cell respiration, reducing the energy available for active nutrient uptake. Roots cannot function properly in anaerobic conditions. This is why compaction and waterlogging are so damaging.

19. D — Deciduous trees translocate nitrogen and other nutrients from leaves to storage tissues before leaf drop, conserving these resources for the next season. This is why fallen leaves are lower in nitrogen than living leaves. Reserves are preserved for spring bud break.

20. C — A latent bud triggered by the loss of a nearby branch grows into an epicormic sprout. These sprouts are weakly attached and often produce poor structure. Topping produces large numbers of epicormic sprouts from many latent buds at once.

21. A — Reaction wood has altered structure and fiber orientation that help counteract a persistent lean. Conifers produce compression wood on the lower side; hardwoods produce tension wood on the upper side. Both responses help correct the lean over time.

22. C — Losing 50% of the canopy reduces photosynthetic capacity and carbohydrate production proportionally. The tree must draw on reserves to survive and refoliate. Severe canopy loss is a major stressor regardless of species.

23. B — Opposite leaf arrangement has leaves borne in pairs directly across from each other at each node. The MAD Horse mnemonic covers the main temperate genera with this arrangement — Maples, Ashes, Dogwoods, and Horse chestnut.

24. D — White oaks have rounded leaf lobes without bristles and acorns that mature in a single growing season. Red oaks have pointed bristle-tipped lobes and acorns maturing over two seasons. These differences are the primary field distinction.

25. A — Red oaks have pointed leaf lobes ending in bristles and produce acorns that mature over two growing seasons. White oaks have rounded lobes without bristles and one-season acorns. Lobe shape is the first identification clue.

26. C — Bald cypress (*Taxodium distichum*) is a deciduous conifer that sheds its needles each autumn. It is one of a small group of deciduous conifers including larch and dawn redwood. Pine, hemlock, and red cedar are evergreen.

27. D — Binomial nomenclature requires the genus capitalized and italicized in print, with the specific epithet lowercase and also italicized. *Acer rubrum* follows the convention correctly. All-caps and all-lowercase forms violate the rules.

28. B — A name in single quotation marks following a species name identifies a cultivar — a cultivated variety propagated clonally. Cultivar names are not italicized. They differ from botanical varieties found in wild populations.

29. C — Horse chestnut (*Aesculus hippocastanum*) has palmately compound leaves of five leaflets, opposite arrangement, and showy upright white or pink flower spikes in spring. It belongs to the soapberry family along with maples. It is the "Horse" in the MAD Horse mnemonic.

30. A — American sycamore (*Platanus occidentalis*) is distinguished by mottled tan and white peeling bark and broad palmate simple leaves. The bark alone often allows identification from a distance. Maples have similar leaves but very different bark.

31. B — MAD Horse identifies Maples, Ashes, Dogwoods, and Horse chestnut — the main temperate genera with opposite leaf arrangement. Most other broadleaf trees are alternate. The mnemonic narrows identification quickly.

32. D — A pinnately compound leaf has leaflets arranged along two sides of a central rachis, like the feathers of a bird. Palmately compound leaves have leaflets clustered at a single point. Ash, hickory, and walnut are pinnate.

33. A — A palmately compound leaf has leaflets radiating from a single attachment point at the end of the petiole. Horse chestnut is the classic example. Pinnately compound leaves have leaflets arranged along a central rachis.

34. C — A 70-foot mature tree planted beneath a 30-foot line will eventually conflict with the conductors. This violates the Right Tree, Right Place principle. Mature size governs species selection near utilities.

35. D — Planting a species with mature height safely under the line is the correct application of Right Tree, Right Place. Matching mature dimensions to site conditions is the core principle. Ignoring mature size is the most common species selection error.

36. B — *Fraxinus* (ash) belongs to the olive family Oleaceae, along with lilacs and forsythias. It is not in the pine, soapberry, or rose families. Family-level recognition matters for understanding pest susceptibilities.

37. A — The 10-20-30 rule limits any single genus to no more than 20% of plantings. Planting 40% of one genus violates this limit. The rule protects against pests that attack multiple species within a genus.

38. C — Tree of heaven (*Ailanthus altissima*) is a non-native invasive species widely documented in eastern North America. It escapes cultivation and colonizes disturbed sites aggressively. It is also the preferred host of the spotted lanternfly.

39. B — Winter identification of deciduous trees relies on bud shape, twig features, and bark character because leaves are absent. These features are reliable enough for confident identification. Experienced arborists can identify most deciduous trees from twigs alone.

40. D — Eastern redbud (*Cercis canadensis*) is native to many eastern states and is an appropriate native planting. The other options are all non-native species, some of which have become invasive.

41. D — Loam has roughly balanced proportions of sand, silt, and clay. It drains adequately, holds enough water, and supports good structure when organic matter is present. Loam is the ideal texture for most tree species.

42. B — A pH of 7.0 is the neutral midpoint of the pH scale, neither acidic nor alkaline. Values below 7.0 are acidic; values above are alkaline. Each whole number represents a tenfold change in hydrogen ion concentration.

43. A — A bulk density of 1.8 g/cm³ indicates severe compaction that halts most root growth. Values above 1.7 progressively limit root penetration. Values below 1.3 generally indicate good structure.

44. C — An ideal mineral soil contains approximately 50% pore space by volume, split roughly between water and air. The remaining 50% is mineral solids and organic matter. Pore space is where roots, water, and air reside.

45. B — A composite sample averages variation across the area being tested, producing a representative result. Multiple subsamples are combined before analysis. Proper sampling is the most important step in soil testing.

46. D — A 36-hour drain time indicates inadequate drainage for most tree species. Drainage longer than 12 to 24 hours signals a drainage problem. Site modification or drainage-tolerant species selection is required.

47. A — Continuous addition of organic matter gradually improves clay soil structure and pore space. Organic matter improves aggregation and creates stable pore space. Texture itself cannot be meaningfully changed, but structure can.

48. C — Iron chlorosis in pin oak growing in alkaline soil is caused by high pH rendering iron chemically unavailable. The iron is present but not in forms roots can absorb. Treatment must address pH or use chelated iron.

49. A — A proper mulch ring is 2 to 4 inches deep with the trunk kept clear. Deeper layers suffocate roots, and piling mulch against the trunk causes bark decay. The correct shape is a flat ring, not a volcano.

50. D — Compaction reduces pore space and starves roots of oxygen needed for respiration. Roots that cannot respire cannot absorb water or nutrients. This is the primary mechanism by which compaction kills urban trees.

51. B — Sandy soils with low organic matter have low CEC because they have few negatively charged sites to hold cations. Cations leach readily after fertilization. Building organic matter is the only practical way to raise CEC.

52. C — Most absorbing roots are found in the upper 12 to 18 inches of soil where oxygen, water, and nutrients are most available. They often extend two to three times beyond the crown radius. The deep taproot image is inaccurate.

53. A — A pH of 4.5 is strongly acidic, well below the neutral value of 7.0. At this level, aluminum and manganese toxicity become concerns for many tree species. Each whole number represents a tenfold concentration change.

54. D — Elemental sulfur lowers soil pH through microbial oxidation that produces sulfuric acid. The process takes time and depends on soil temperature and moisture. Sulfur is the standard amendment for acidifying alkaline soils.

55. C — A wide hole (2 to 3 times the root ball diameter) provides loosened soil into which new roots can expand during establishment. A hole dug just to ball width offers no expansion zone. Width matters more than depth.

56. B — Setting the root flare at or slightly above grade preserves the flare tissue from burial decay. Burying the flare is the most common serious planting error, leading to long-term decline. Proper depth is essential for long-term health.

57. D — Native soil backfill allows roots to transition smoothly into surrounding soil during establishment. Heavily amended backfill can produce pot-bound conditions in the ground. Current best practice is unamended native soil.

58. A — A widely used rule of thumb is one year of establishment per inch of trunk caliper. A 4-inch caliper tree needs about four growing seasons. During this period the tree rebuilds its root system.

59. B — Rigid staking for extended periods prevents wind flexing that would otherwise stimulate reaction wood and basal thickening. The result is a thinner trunk with reduced taper. This is why staking should be removed within one growing season.

60. C — A circling root left uncorrected becomes a permanent defect that eventually girdles the trunk as both roots and trunk grow. Correction must occur at planting. Once backfilled, the defect is difficult to address.

61. C — Removing the upper portion of the wire basket eliminates the potential for future girdling as the root system expands. Burlap and twine at the trunk should also be cut. Lower portions of the basket can be left in place.

62. A — Lifting a B&B tree by the root ball preserves the trunk-to-root connection that lifting by the trunk would destroy. Trunk lifting can separate the trunk from the ball. This is a fundamental B&B handling rule.

63. D — Twine tied around the trunk does not decompose reliably and can girdle the trunk as it grows. Synthetic twine in particular persists indefinitely. Removing it at planting prevents years of later damage.

64. B — Consistent moisture without saturation provides adequate water while allowing the root ball to exchange gases. Both extremes are damaging — dry desiccates, saturated suffocates. Checking soil moisture directly is more reliable than fixed schedules.

65. A — Fertilization of a newly planted tree during its first growing season is generally unnecessary and can force growth exceeding the reduced root system's capacity. Skipping fertilization avoids this imbalance. Establishment does not require added nutrients in most cases.

66. C — Dormant-season transplanting minimizes stress because the tree is not actively transpiring. Root loss is less immediately damaging when metabolic demand is low. Summer transplanting carries much higher risk.

67. B — Advance root pruning along the future ball line stimulates new fibrous root development inside the line. These fibrous roots are harvested with the ball and dramatically improve transplant survival. The technique is essential for large specimens.

68. D — A tree that fails to leaf out the spring after planting most likely suffered root ball desiccation during handling or planting. Damaged or dried-out roots cannot support bud break. Proper handling prevents most of these failures.

69. A — A buried root flare develops bark decay because the tissue is not adapted to underground conditions. Decline progresses over years rather than immediately. This is the most common serious planting error.

70. C — A hole dug to exact ball width offers no zone of loosened soil for new roots to expand into. Width matters more than depth in planting. Two to three times the ball diameter is the correct standard.

71. D — Inspection at delivery should focus on trunk condition, crown structure, visible root flare, and root ball condition. Defects identified at delivery can be avoided by rejecting the tree. Inspection is more than checking the manifest.

72. B — Removing stakes within one growing season allows natural wind flexing that stimulates reaction wood and trunk taper. Prolonged staking produces weaker trunks. Natural mechanical stress builds structural strength.

73. C — A cut placed just outside the branch collar preserves the cambium that forms Wall 4. Wall 4 is the strongest CODIT wall and is essential for proper compartmentalization. Flush cuts destroy this tissue.

74. A — Topping creates large wounds that cannot close, removes excessive foliage, depletes carbohydrate reserves, and produces weakly attached epicormic sprouts. It violates every principle of proper pruning. ANSI A300 explicitly prohibits it.

75. B — The three-cut method prevents bark from tearing downward along the trunk when a heavy branch falls. A single cut from above causes the falling weight to rip bark. The undercut severs this bark pathway in advance.

76. D — Cleaning is the selective removal of dead, dying, diseased, broken, and weakly attached branches. It is one of the five primary pruning objectives recognized by ANSI A300. Cleaning is the most common routine objective.

77. A — A reduction cut removes a branch back to a lateral large enough (typically at least one-third the diameter of the removed portion) to assume the terminal role. This produces natural-looking reduction with proper wound response. Heading cuts leave arbitrary stubs.

78. C — Structural pruning during the juvenile phase makes small corrective cuts that prevent larger, more damaging cuts decades later. The architectural framework is still being established. Waiting until maturity is far less effective.

79. B — Removing more than 25% of a mature tree's live foliage exceeds the 10 to 15% guideline and depletes reserves. The result is weakly attached epicormic sprouts and declining health. This is why the guideline exists.

80. D — Cut placement outside the branch bark ridge preserves the cambium that forms Wall 4, enabling successful wound closure. The branch bark ridge is the reference point for correct cut placement. Proper placement is the single most important factor.

81. A — A flush cut removes the branch collar along with the branch, eliminating the cambium that would have formed Wall 4. The result is a wound that cannot be effectively compartmentalized. Flush cuts provide a direct pathway for decay.

82. D — A stub cut leaves dead wood projecting beyond the branch collar that cannot be compartmentalized by the tree. The dead stub becomes an entry point for fungal colonization. Decay eventually reaches the collar and then the trunk.

83. C — Bypass blades cut with a scissor-like action between two curved blades, producing clean cuts without crushing tissue. Anvil blades press the stem against a flat surface and tend to crush. Bypass blades are correct for living wood.

84. B — A pole pruner is most appropriate for small-diameter branches out of reach from the ground that do not warrant climbing. Larger branches require more controlled methods. Pole pruners extend reach without requiring positioning.

85. D — Removing 50% of live foliage from a mature tree far exceeds the 10 to 15% guideline and would initiate decline. The professional response is to explain that the request violates accepted standards. Client education is part of professional practice.

86. A — Codominant stems with included bark should be corrected early, while the tree is young and the cuts are small. Subordination or removal shifts dominance to a single leader. Waiting until maturity requires much larger cuts.

87. C — The raise objective refers to selective removal of lower branches to provide vertical clearance beneath the crown. It is one of the five primary pruning objectives in ANSI A300. Raising should be done gradually on young trees.

88. B — Tool disinfection is most important when pruning trees with contagious vascular diseases such as fire blight or Dutch elm disease. Disease organisms can transfer between cuts on contaminated blades. For routine work on healthy trees, disinfection is less critical.

89. A — A written specification including objective, scope, and standards provides clear expectations for the work and protection for all parties. Specifications prevent disputes and ensure professional results. They are a core element of commercial tree work.

90. D — Removing a dead branch is part of the cleaning pruning objective, which includes selective removal of dead, dying, diseased, broken, and weakly attached branches. Cleaning is the most common routine objective.

91. B — Cut placement relative to the branch collar is the single most important factor in whether a pruning wound closes successfully. Correct placement preserves the Wall 4 cambium; incorrect placement eliminates it. Tool brand and weather matter far less.

92. C — The three-cut method prevents bark from tearing downward along the trunk when a heavy branch falls. A single cut from above causes the falling weight to rip bark. The undercut severs this bark pathway in advance.

93. D — Pruning oaks during dormancy reduces the risk of attracting sap-feeding beetle vectors that spread oak wilt. Timing is the primary defense in affected regions. Dormant-season pruning minimizes transmission risk.

94. A — Lion-tailing strips interior foliage and concentrates weight at the branch ends, creating weaker branches than properly distributed thinning. Interior foliage cushions wind loads and its removal weakens branches. It is explicitly discouraged.

95. C — Pollarding is a long-term management system requiring repeated cuts at the same framework points on an ongoing schedule. It must begin on young trees at specific points and be maintained over years. It cannot be started on a mature tree.

96. B — Restoration pruning gradually develops acceptable crown structure from the sprouts that emerged after topping or severe damage. It is a long-term process requiring multiple visits over years. It cannot undo the original damage.

97. A — Subordination reduces the growth of a competing stem in favor of a dominant leader, gradually shifting dominance without the wound of outright removal. It is used to correct codominant stems in young trees.

98. D — Current research shows wound dressings provide minimal benefit and in some cases actually slow compartmentalization by trapping moisture. Current best practice is to leave pruning cuts unsealed. The natural wound response is most effective.

99. B — A cut at the exact midpoint of a branch length is a heading cut that leaves an arbitrary stub without regard to laterals. Proper reduction cuts go back to a lateral large enough to assume the terminal role. Midpoint cuts are not proper reduction cuts.

100. C — Structural pruning during the juvenile growth phase produces the greatest benefit because small cuts now correct defects that would otherwise require larger, more damaging cuts decades later. The architectural framework is still being established.

101. D — Diagnosis begins with identifying the species and understanding its normal characteristics, because a symptom cannot be evaluated without knowing what a healthy specimen looks like. Jumping to treatment leads to routine misdiagnosis.

102. B — A fungal fruiting body on a trunk is a sign indicating active decay already established within the tree. Fruiting bodies are the reproductive stage of fungi whose vegetative bodies extend into the tree. Signs are more reliable than symptoms.

103. A — Symptoms are the tree's response to a problem — wilting, yellowing, dieback, thinning. Symptoms indicate that something is wrong but usually do not identify the specific cause. Multiple problems can produce overlapping symptoms.

104. C — A primary pest can attack and kill healthy, vigorous trees on its own without requiring the host to be stressed first. Secondary pests attack only weakened trees. The distinction is critical for management.

105. D — Emerald ash borer causes canopy decline and death in healthy ash trees regardless of size. This is what distinguishes it from most native wood borers and makes it a primary pest. EAB has devastated ash populations across North America.

106. A — IPM is a decision-making framework that integrates monitoring, action thresholds, multiple control tactics, and outcome evaluation. It is not a specific product or a prohibition on pesticides. The least toxic effective option is preferred.

107. B — Fire blight is caused by the bacterium *Erwinia amylovora* and affects members of the rose family (Rosaceae), including apple, pear, hawthorn, and serviceberry. Family-level recognition matters because susceptibility extends across the family.

108. C — Oak wilt spreads through root grafts between adjacent oaks and through sap-feeding beetles attracted to fresh wounds. The beetle-vector pathway makes warm-season pruning of oaks particularly risky in affected regions.

109. D — Iron is an immobile nutrient, and deficiency appears first on new leaves as interveinal chlorosis with green veins. In alkaline soil, iron is chemically unavailable despite being present. Treatment must address pH or use chelated iron.

110. A — Nitrogen is a mobile macronutrient that the tree translocates from older leaves to support new growth when supply is inadequate. Deficiencies therefore appear first on older inner leaves as uniform yellowing. All mobile-nutrient deficiencies follow this pattern.

111. C — Cupping and twisting of new growth most likely indicates phenoxy herbicide exposure such as 2,4-D, which mimics plant growth hormones. The pattern is often most severe on the side nearest the application source.

112. B — Delayed decline several years after construction almost always reflects root damage that occurred during the work. Trees mobilize reserves to mask initial injury, and visible symptoms appear when reserves are exhausted. Monitoring should continue for several growing seasons.

113. A — Anthracnose is a fungal leaf disease producing spots, blotches, and leaf distortion, often followed by premature leaf drop. Most anthracnose infections are cosmetic rather than life-threatening. Sycamore anthracnose is a particularly visible example.

114. D — Armillaria root rot produces characteristic white mycelial sheets (fungal tissue) beneath the bark of infected roots, visible when the bark is peeled back. Honey-colored mushrooms may also appear at the base in fall.

115. B — Dutch elm disease is a vascular wilt spread primarily by elm bark beetles carrying fungal spores and by root grafts between adjacent elms. This dual pathway is why the disease caused the near-total loss of American elm as a street tree.

116. A — Trunk injection of systemic insecticides is most appropriate for high-value trees threatened by borers, where foliar sprays would be impractical or ineffective for reaching internal tissues. Injection provides rapid systemic distribution with low environmental exposure.

117. C — "The label is the law" means pesticide labels are legally enforceable federal documents. Applications must match the uses, rates, sites, and methods authorized on the label. Deviations carry legal and liability consequences.

118. D — When no effective treatment exists, the professional response is to communicate the diagnosis honestly and recommend appropriate management, which may include monitoring, removal, or supportive care. Honesty is part of professional standing.

119. B — The CRZ is commonly calculated as a radius of one foot per inch of trunk DBH. A 24-inch DBH tree has a 24-foot radius CRZ. This formula is the standard reference in ISA Best Management Practices.

120. A — Placing fencing at the CRZ boundary or further out protects the majority of absorbing roots from compaction and damage. Using only the dripline leaves most roots exposed. The CRZ formula produces a more defensible boundary.

121. C — The high pH of cement washwater can sterilize soil and kill roots in the affected area. Concrete washout within a TPZ is among the most damaging activities on construction sites and must be explicitly prohibited.

122. B — Raising the grade buries existing roots and root flares under added soil, producing gradual decline as buried tissues lose access to oxygen. Symptoms develop over months or years as reserves are exhausted.

123. D — Directional boring passes a utility beneath the root zone without disturbing the soil at root depth. Conventional trenching through the CRZ is the most damaging option. Higher equipment cost typically favors boring when tree value is significant.

124. A — Storage of construction materials within a TPZ compacts the underlying soil under the weight and smothers roots. This is one of the standard prohibitions enforced by TPZ fencing. Compaction is difficult to reverse.

125. C — Pre-construction tree assessment should occur before final design so findings can influence project decisions. Assessment after drawings are complete is reduced to documentation of what has already been decided.

126. D — Clean cuts with sharp tools at the damage line produce better wound responses than the tearing and crushing of unprepared excavation. The cambium can compartmentalize a clean cut more effectively. This should be done before excavation begins.

127. B — Post-construction care includes deep periodic watering, generous mulching, conservative pruning focused on deadwood and safety, and annual monitoring for at least three to five growing seasons. Patience drives recovery.

128. A — The actual root system of a mature tree typically extends two to three times the crown radius, well beyond the dripline. Using the dripline as the protection boundary leaves most absorbing roots exposed to damage.

129. C — Delayed decline following construction damage typically becomes visible months to several years after the triggering event. Trees mobilize reserves to mask initial injury, and when reserves are exhausted, decline begins.

130. D — Tree protection fencing should be sturdy, visible, clearly marked with signage, and maintained throughout construction. Flimsy flagging is routinely moved or ignored. Proper fencing is a durable construction-period boundary.

131. A — Excluding all activity — traffic, equipment, and materials — from the root zone is the single most effective action during construction. Compaction and root damage are prevented most reliably by keeping activity out entirely.

132. B — Lowering the grade removes soil along with any roots growing in it, producing immediate direct loss of functional root tissue. Even a few inches of grade cut can remove a large share of absorbing roots concentrated near the surface.

133. D — A baseline condition report documents pre-existing tree conditions for later comparison. It protects all parties when damage is alleged after construction, allowing actual damage to be distinguished from pre-existing conditions.

134. C — A tree showing no visible symptoms one year after construction is not yet out of danger, because delayed decline can appear one to three years later as reserves are exhausted. Monitoring should continue for at least three to five growing seasons.

135. A — Hand or air excavation allows workers to identify and preserve roots individually rather than severing them blindly. These techniques trade labor cost for root preservation. They are appropriate when roots must be crossed.

136. B — A tree that has contacted an energized line should be treated as potentially energized until the utility confirms de-energization. A branch in contact with a line can energize the entire tree. Approaching without confirmation is a serious safety risk.

137. C — Risk is formally defined as the combination of likelihood of failure and severity of consequences. Neither tree condition nor target presence alone constitutes risk. Both factors must be considered together.

138. D — Level 1 assessment is a rapid limited visual screening used for large tree populations along streets, through parks, or across properties. Its purpose is to identify obvious hazards requiring further evaluation.

139. A — A Level 2 assessment is a detailed visual inspection of an individual tree, typically performed while walking around it from multiple angles using basic tools. It is the standard level for trees of individual concern.

140. B — Level 3 assessment techniques include resistograph drilling, sonic tomography, static load testing, and other advanced instrumentation. These tools are reserved for high-value trees or situations with significant uncertainty after Level 2.

141. C — Included bark between codominant stems prevents formation of a strong structural union by trapping bark tissue that should have knit together as solid wood. The attachment becomes progressively weaker as the stems grow.

142. A — The presence of a fungal fruiting body on a trunk indicates that active decay is already established within the tree's tissues. Fruiting bodies are the reproductive stage of fungi whose vegetative bodies extend into the tree.

143. D — A target is any person, property, or activity that could be affected by a failing tree or tree part. Targets include pedestrians, vehicles, buildings, utility lines, and outdoor activities. Without targets, even high failure likelihood does not produce high risk.

144. B — Target occupancy rate measures the frequency and duration of target presence within the potential strike zone. Higher occupancy contributes to higher overall risk because failures are more likely to coincide with target presence.

145. C — A new lean combined with fresh soil cracking on the opposite side indicates root plate movement and elevated risk of uprooting failure. Trees showing these signs should be considered at imminent risk. Immediate action may be warranted.

146. A — Sounding the trunk with a mallet produces a solid ringing sound over intact wood and a dull hollow sound over decayed or hollow areas. It is a simple but useful technique for detecting large decay columns that might otherwise be missed.

147. D — The TRAQ risk matrix combines likelihood of failure and impact (probability that failure will occur and strike a target) with consequences of failure (severity if impact occurs). The combination produces the overall risk rating.

148. B — A probable likelihood of failure in TRAQ means failure is likely to occur during the assessment time frame under normal conditions. The four levels are improbable, possible, probable, and imminent.

149. A — The severe consequence level in TRAQ applies to catastrophic property damage, serious injury, or death. Minor consequences involve minor damage or injury; significant consequences fall between.

150. C — A tree with an internal cavity may still be structurally sound if sufficient intact wood remains around the cavity perimeter to resist bending forces. A common guideline holds that at least one-third of the diameter should remain as sound wood.

151. B — Consequences of failure depend on the size of the falling part, the height from which it would fall, and the nature of the target it would strike — all three factors together. A single factor alone cannot predict severity.

152. D — Residual risk is the risk that remains after mitigation measures have been implemented. No mitigation eliminates risk entirely — pruned trees can still fail, cabled unions can still split. Clients must understand they are choosing acceptable risk levels.

153. A — A professional report should document scope, defects, targets, mitigation, and residual risk. Recommendations must be proportional to actual risk. Blanket removal recommendations damage professional credibility.

154. C — Cabling and bracing provide supplemental support that reduces but does not eliminate structural risk. The installations require ongoing inspection and maintenance. They are appropriate when defects cannot be addressed by pruning alone.

155. D — Effective client communication uses plain language, presents options rather than ultimatums, and respects the owner's decision-making authority. Technical jargon, pressure tactics, and withholding information all damage credibility.

156. B — Root defects are difficult to evaluate because roots are below ground and cannot be directly observed. Arborists rely on indirect indicators such as root plate movement, fungal fruiting bodies at the flare, and construction history.

157. A — Healthy rounded callus tissue around a small old wound indicates successful compartmentalization and closure. This is evidence of normal healing, not a structural defect. The tree has successfully walled off the original injury.

158. C — Reduction pruning decreases end weight on an overextended branch, reducing the leverage and failure likelihood. It addresses the identified defect without removing the entire tree. It is a standard mitigation for moderate risk.

159. B — ANSI Z133 is the American National Standard for Arboricultural Operations — Safety Requirements and is the principal safety standard for tree care work. ANSI A300 addresses pruning; Z133 addresses safety.

160. D — The minimum approach distance for unqualified workers to energized distribution lines below 50 kV is 10 feet under ANSI Z133. This is the most commonly cited MAD figure and applies to most lines in residential and commercial tree work.

161. B — A qualified line-clearance arborist has completed specialized training in electrical hazards, safe work procedures near energized lines, use of insulated tools, and emergency response to electrical contact. This training cannot be acquired informally.

162. C — A climbing helmet must have a chin strap to retain the helmet during active climbing, rigging, and inverted positions. Traditional construction hard hats without chin straps can fall off during dynamic movement.

163. A — Chainsaw-resistant leg protection contains cut-resistant fibers (ballistic nylon or aramid) that clog the chain of a running saw on contact, stopping the chain before it reaches the leg. The protection dramatically reduces injury severity.

164. D — OSHA requires hearing protection when noise levels exceed 85 decibels, and chainsaw operation routinely produces noise well above this threshold. Repeated exposure without protection causes progressive and irreversible hearing loss.

165. B — A proper job briefing covers work scope, hazards, procedures and precautions, required PPE, and emergency response procedures. It is required under ANSI Z133 and is not optional. Briefings prevent predictable mistakes.

166. A — ANSI Z133 requires aerial rescue capability on essentially every climbing operation with a crew — at least one worker other than the climber must be trained and equipped to perform a rescue. Outside emergency services alone are inadequate.

167. C — Suspension trauma develops when a climber remains motionless in a harness because reduced venous return causes blood to pool in the legs. It can become life-threatening within 30 minutes of immobility.

168. D — The kickback zone is the upper portion of the bar tip. Contact between this area and any object can trigger a violent upward and backward reaction. Awareness of tip position throughout every cut is a foundational safety skill.

169. B — The chain brake is designed to stop the chain when activated manually by the front handguard or automatically by kickback motion. It is an essential safety feature that must be functional on every saw in service.

170. A — The left hand should grip the front handle with the thumb wrapped fully around the handle. This grip is stronger and provides better control if the saw moves unexpectedly. It is the standard grip for all chainsaw operation.

171. C — Two-handed operation is the standard practice for nearly all chainsaw use and is required except in specific climbing situations using top-handle saws. The standard grip provides maximum control and reduces injury risk.

172. D — Top-handle chainsaws are designed specifically for climbing arborist use up in the canopy, where compact size and potential one-handed operation are required. They should not be used by untrained workers or for ground-based work.

173. A — The chain catcher is a projection beneath the bar designed to catch the chain if it breaks or derails during operation, preventing it from whipping toward the operator. It is one of several safety features on modern chainsaws.

174. B — Working load limit is commonly calculated as approximately one-tenth of the tensile strength of rigging equipment. A rope with 14,000 pounds tensile strength has a WLL of about 1,400 pounds. This margin protects against shock loading and wear.

175. D — Shock loading is the dynamic force generated when a falling piece is suddenly caught by the rigging rope. Peak forces can be many times the static weight of the piece depending on fall distance and system elasticity.

176. C — Allowing controlled slip through a friction device such as a Port-a-Wrap distributes the energy of the catch over time rather than stopping the load instantly. The result is a dramatically lower peak force compared to a hard tie-off.

177. A — A block redirecting a rigging load over an anchor experiences approximately twice the force of the load itself, because the block holds both the lifting side and holding side of the rope simultaneously. This doubling is a routine source of anchor failure.

178. B — The hinge is the strip of wood between the notch and the back cut that controls fall direction as the tree begins to fall. It must remain intact to guide the tree along the intended fall line. Hinge width should be approximately 10% of trunk diameter.

179. D — An escape route must be planned and cleared before cutting begins and followed immediately as the tree starts to fall. The route should lead away from the tree at about 45 degrees from the fall line on the opposite side.

180. C — Barber chair is a vertical splitting of the trunk upward along the grain during the back cut, caused by cutting the hinge too thin or making the back cut too slowly. It can propel trunk sections backward at high speed.

181. A — Chipper operators should feed branches butt end first while standing to the side of the infeed. Standing to the side avoids struck-by hazards from branches that flex or kick back. Standing directly behind is a recurring cause of serious injury.

182. B — Aerial lift operators must maintain the minimum approach distance with both the bucket and the boom, because the metal boom is an excellent conductor and can carry electricity from a contacted line throughout the machine.

183. D — PPE must be inspected before every use, and items showing damage, wear, or contamination must be retired immediately and replaced. Continuing to use compromised PPE provides reduced or no protection. Annual inspection alone is inadequate.

184. C — ANSI Z133 requires climbing ropes to have a tensile strength of at least 5,400 pounds for arboricultural climbing applications. This value provides the margin needed for the dynamic loads generated during climbing and rigging.

185. B — A properly tied friction hitch must grip the rope reliably under load while permitting controlled adjustment when the climber changes position. A hitch that slips under load is unsafe; one that locks rigidly prevents smooth climbing.

186. A — The feed control bar on a wood chipper is a safety device that stops the feed rollers when pressed, allowing the operator to halt material feed in an emergency. It must be functional and within reach.

187. D — Chainsaws should be stopped and allowed to cool briefly before refueling. Refueling a running or hot saw risks fire from spilled fuel contacting hot components. This is one of the basic safety rules of power equipment handling.

188. C — A first aid kit should be available on every tree care worksite and stocked appropriately for the hazards of the work. This includes supplies for treating chainsaw lacerations, bleeding, and minor injuries that occur routinely.

189. B — Urban trees reduce the urban heat island effect through shading of surfaces and evapotranspiration cooling. Paved cities can be 5 to 10 degrees warmer than surrounding areas, and tree canopy substantially reduces this difference.

190. A — A complete tree inventory records every tree within the defined inventory area, with information on species, size, condition, location, and management needs. Sample inventories cover a statistically representative subset.

191. C — The i-Tree suite developed by the USDA Forest Service allows communities to estimate the dollar value of ecosystem services — stormwater interception, air quality improvement, carbon sequestration, and energy savings — provided by their tree populations.

192. D — The trunk formula method is used when a tree is too large to be practically replaced by nursery stock. It calculates value from trunk cross-sectional area adjusted by species, condition, and location ratings.

193. B — Tree protection ordinances typically require permits for removal of protected trees above a specified size threshold, with penalties for unauthorized removal. Specific provisions vary between jurisdictions.

194. A — Canopy cover goals are typically expressed as the percentage of land area covered by tree canopy, measured through aerial imagery analysis. They provide a high-level metric for tracking urban forest size.

195. C — Tree City USA requires a community forestry budget of at least two dollars per capita annually, along with a tree board, tree care ordinance, and Arbor Day observance. The program recognizes baseline commitment to urban forestry.

196. D — Species rating in plant appraisal reflects the desirability and suitability of the species in the local area. High-quality species well adapted to the location receive higher ratings; invasive or poorly suited species receive lower ones.

197. A — Effective communication with property owners uses plain language and respects the owner's decision-making authority. Technical jargon, pressure tactics, and refusal to share information all damage credibility. The client makes the final decision.

198. B — Multiple studies have found improved mental health outcomes and reduced stress for residents of neighborhoods with more trees, along with faster recovery from illness and increased physical activity. The human-health case is increasingly central.

199. C — A budget-focused council responds to the documented dollar value of ecosystem services and infrastructure savings, not to aesthetic arguments or staff preferences. Matching the message to the audience is basic professional communication.

200. D — Diverse plantings following the 10-20-30 rule protect communities against catastrophic pest-driven canopy loss when species-, genus-, or family-specific pests arrive. Dutch elm disease and emerald ash borer illustrate why diversity matters.