PRACTICE EXAM 13: ISA CERTIFIED ARBORIST SIMULATION

PRACTICE EXAM 13 — QUESTIONS 1–200

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

1. All of the following are true of the vascular cambium EXCEPT:

A. It produces new xylem cells toward the center of the trunk

B. It produces new phloem cells toward the outside of the trunk

C. It is composed of dead cells with extractives in their walls

D. It is the most metabolically active layer of a mature trunk

2. Which of the following is NOT a function of phloem?

A. Conducting water upward from roots to leaves

B. Transporting sugars from leaves to roots and other sinks

C. Supplying growing tips with carbohydrate from storage

D. Translocating photosynthate to storage tissues

3. All of the following describe the cohesion-tension theory of water movement EXCEPT:

A. Hydrogen bonding holds water columns together under tension

B. Evaporation from leaf surfaces generates the driving force

C. No metabolic energy is required from the tree itself

D. Active pumping in the root cortex lifts water upward

4. Which of the following is NOT one of the four CODIT walls?

A. Wall 1, plugging vertical xylem vessels

B. Wall 5, forming in the outer corky bark

C. Wall 3, resisting lateral spread through ray tissue

D. Wall 4, formed by the cambium after wounding

5. All of the following are true of carbohydrate reserves in temperate trees EXCEPT:

A. They fuel spring bud break and refoliation

B. They support wound response and pest defense

C. They reach their highest level in late spring after leaf-out

D. They are stored primarily as starch in living parenchyma

6. Which of the following is NOT a characteristic of tree respiration?

A. It produces sugars from carbon dioxide and water

B. It consumes stored carbohydrates to release energy

C. It occurs continuously in every living cell

D. It proceeds day and night throughout the year

7. All of the following are functions of leaf stomata EXCEPT:

A. Allowing carbon dioxide entry for photosynthesis

B. Releasing water vapor during transpiration

C. Releasing oxygen as a byproduct of photosynthesis

D. Anchoring the leaf blade firmly to the petiole

8. Which of the following is NOT true of heartwood?

A. It is composed of dead cells with deposited extractives

B. It is the primary site of water conduction in mature trees

C. It provides structural support to the trunk

D. It typically resists decay better than sapwood

9. Which plant hormone is primarily responsible for apical dominance in a young tree?

A. Auxin produced at the shoot tip

B. Cytokinin produced in the active root tips

C. Ethylene released during fruit ripening

D. Abscisic acid from dormant winter buds

10. All of the following describe mycorrhizal partnerships with trees EXCEPT:

A. Fungal hyphae extend the absorbing surface into soil

B. The tree provides sugars to the fungal partner

C. The fungus fixes atmospheric nitrogen within the roots

D. The partnership is essential for most tree species

11. Which of the following is NOT true of a mature tree's absorbing roots?

A. Most are found in the upper 12 to 18 inches of soil

B. Most are concentrated in a deep central taproot

C. They often extend two to three times the crown radius

D. They require soil oxygen for respiration and function

12. All of the following describe how trees respond to wounds EXCEPT:

A. They wall off damaged areas with internal barriers

B. The branch collar cambium produces Wall 4

C. The process is called compartmentalization, or CODIT

D. Damaged tissue is replaced by new regenerated wood

13. A tree girdled by a tight wire eventually dies primarily because:

A. Phloem is severed and the roots starve of sugars

B. Xylem is blocked and water stops moving upward

C. Oxygen is prevented from reaching the inner bark

D. Nitrogen cannot move upward to the canopy

14. When a tree closes its stomata during drought, the most direct consequence is a:

A. An immediate increase in root water uptake

B. A surge of new shoot growth at apical buds

C. Simultaneous reduction of transpiration and photosynthesis

D. Acceleration of respiration in the deepest roots

15. All of the following are true of reaction wood in trees EXCEPT:

A. It forms in response to mechanical wind stress

B. It contributes to greater trunk taper over time

C. It is produced by the vascular cambium

D. It forms only in rigidly staked young trees

16. Which of the following is NOT true of the water-conducting cells in xylem?

A. They are dead at functional maturity

B. They require constant metabolic respiration to function

C. They form hollow tubes for upward water transport

D. They rely on the cohesion-tension mechanism

17. Which tissue is responsible for adding width to a tree trunk each year?

A. The vascular cambium between xylem and phloem

B. The pith at the very center of the stem

C. The heartwood cylinder inside the sapwood

D. The outer corky layer of the bark

18. All of the following are functions of a tree's bark EXCEPT:

A. Protecting against mechanical damage

B. Reducing water loss from internal tissues

C. Providing a barrier against pathogen entry

D. Conducting water upward from roots to leaves

19. Where in a mature tree is the highest concentration of absorbing roots typically found?

A. Below 4 feet in the deeper subsoil zone

B. In a central taproot directly below the trunk

C. In the upper 12 to 18 inches of soil, often beyond the dripline

D. Within the heartwood of the lower trunk

20. Which of the following is NOT a temperate tree genus with opposite leaf arrangement?

A. *Acer*, the maple genus

B. *Quercus*, the oak genus

C. *Fraxinus*, the ash genus

D. *Aesculus*, the horse chestnut genus

21. The MAD Horse mnemonic identifies which tree characteristic?

A. Genera with palmately compound leaves

B. Trees with distinctive peeling bark patterns

C. Conifers that shed their needles each autumn

D. Common temperate genera with opposite leaf arrangement

22. All of the following distinguish white oaks from red oaks EXCEPT:

A. White oaks have pointed lobes with bristle tips

B. White oak acorns mature in a single growing season

C. White oak leaves have rounded lobes without bristles

D. White oaks are generally more resistant to oak wilt

23. Which of the following is the correct written format for a scientific tree name?

A. ACER RUBRUM written in bold capitals

B. *acer rubrum* written entirely in lowercase

C. *Acer rubrum* with the genus capitalized and italicized

D. *Acer Rubrum* with both words capitalized

24. Which of the following is NOT true of a plant cultivar name?

A. It is written in single quotation marks

B. It is italicized along with the species name

C. It indicates a cultivated variety propagated clonally

D. It follows the species name in written nomenclature

25. Which of the following is a deciduous conifer that sheds its needles each autumn?

A. Bald cypress in the genus *Taxodium*

B. Eastern white pine in the genus *Pinus*

C. Eastern hemlock in the genus *Tsuga*

D. Eastern red cedar in *Juniperus*

26. The 10-20-30 rule of urban tree diversity limits maximum percentages at which three levels?

A. Order, family, and genus combined

B. Cultivar, species, and genus levels

C. Genus, family, and order combined

D. Species, genus, and family of the planting

27. Which of the following is widely classified as an invasive species in eastern North America?

A. Flowering dogwood native to many states

B. Tree of heaven introduced from Asia

C. Eastern redbud native to eastern forests

D. American sycamore native to floodplains

28. A tree with a mature height of 60 feet is planted beneath a 30-foot utility line. This planting violates which principle?

A. The 10-20-30 diversity rule

B. The ANSI A300 pruning standard

C. The Right Tree, Right Place principle

D. The ISA Best Management Practice for mulching

29. Which of the following best describes a pinnately compound leaf?

A. Leaflets arranged along two sides of a central rachis

B. Leaflets radiating from a single attachment point

C. A single blade with deeply cut lobes

D. Multiple leaves joined at a common petiole

30. Which group of trees all have alternate leaf arrangement?

A. Maple, ash, and dogwood in mixed forests

B. Catalpa, paulownia, and viburnum in hedgerows

C. Horse chestnut, buckeye, and dogwood together

D. Oak, hickory, and beech in eastern forests

31. A tree with mottled tan and gray peeling bark and broad palmate leaves is most likely:

A. Sugar maple in the soapberry family

B. American sycamore in the plane family

C. Shagbark hickory in the walnut family

D. Norway maple introduced from Europe

32. Which statement best describes the Right Tree, Right Place principle?

A. Matching nursery prices to homeowner budgets

B. Matching leaf color to landscape design preferences

C. Matching mature tree characteristics to planting site conditions

D. Matching trunk caliper to standardized planting depths

33. The ash genus *Fraxinus* belongs to which plant family?

A. Pinaceae, the pine family

B. Rosaceae, the rose family

C. Sapindaceae, the soapberry family

D. Oleaceae, the olive family

34. Which of the following is NOT a legitimate advantage of native tree species over non-natives?

A. Automatic immunity from all local pests and diseases

B. Co-adaptation to local climate and soil conditions

C. Support for local pollinators and wildlife

D. Generally lower maintenance requirements in the region

35. Which feature is NOT used for winter identification of leafless deciduous trees?

A. Bud shape and arrangement on the twig

B. Leaf margin and venation of new spring foliage

C. Bark character on the mature trunk

D. Twig features such as leaf scars

36. A tree with palmately compound leaves bearing five to seven leaflets, opposite arrangement, and showy upright spring flower spikes is most likely:

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

37. Which combination of features is diagnostic for the maple genus *Acer*?

A. Opposite leaf arrangement with paired winged samaras

B. Alternate leaf arrangement with acorn fruits

C. Whorled arrangement with pine cone fruits

D. Compound leaves with single winged samara fruits

38. Which of the following is NOT one of the MAD Horse genera with opposite leaf arrangement?

A. *Acer*, the maple genus

B. *Fraxinus*, the ash genus

C. *Cornus*, the dogwood genus

D. *Carya*, the hickory genus

39. Which of the following distinguishes red oaks from white oaks?

A. Rounded leaf lobes that lack any bristle tips

B. Pointed leaf lobes ending in bristles

C. Acorns that mature in a single growing season

D. Smoother bark that remains flaky throughout life

40. Which of the following is a native tree species in much of eastern North America?

A. Tree of heaven introduced from Asia

B. Norway maple introduced from Europe

C. Eastern redbud native to many states

D. Callery pear originally from China

41. Which of the following is NOT true of loam soil?

A. It contains balanced proportions of sand, silt, and clay

B. It is composed primarily of fine clay particles

C. It drains adequately while holding sufficient water

D. It is considered ideal for most tree species

42. On the soil pH scale, which of the following is NOT correct?

A. The scale runs from 0 to 14

B. A value of 7.0 is considered neutral

C. Values below 7.0 are acidic

D. Each whole number represents a 100-fold change in H^+

43. Cation exchange capacity in soil is primarily determined by:

A. The clay content and organic matter present

B. The annual rainfall received at the site

C. The temperature of the soil through the year

D. The depth of the topsoil horizon

44. Compaction harms tree roots primarily by:

A. Concentrating salts at lethal levels in the root zone

B. Raising soil temperatures excessively near the surface

C. Reducing pore space and starving roots of oxygen

D. Increasing soil acidity below the cambial zone

45. An ideal mineral soil contains approximately what percentage of pore space?

A. About 10 percent of the total volume

B. About 25 percent of the total volume

C. About 75 percent of the total volume

D. About 50 percent of the total volume

46. A pin oak with interveinal chlorosis on new leaves in alkaline soil most likely has:

A. A nitrogen deficiency from lawn competition

B. Iron unavailable due to high soil pH

C. Excessive potassium suppressing magnesium

D. Sulfur excess from a nearby industrial source

47. All of the following are benefits of proper mulching EXCEPT:

A. Supplying all of the tree's nitrogen needs each year

B. Conserving moisture in the root zone

C. Moderating soil temperatures over time

D. Suppressing competing weeds near the trunk

48. A perc test result of 36 hours drain time indicates:

A. Drainage excessive for most tree species

B. Ideal drainage for any species available

C. Drainage inadequate for most tree species

D. Permanently waterlogged saturated conditions

49. Which statement best explains why soil texture is considered essentially permanent?

A. Organic matter continuously regenerates the original texture

B. Microbial activity restores the original particle mix

C. Laboratory tests cannot identify true texture changes

D. Sand, silt, and clay proportions cannot be meaningfully altered

50. A bulk density of 1.8 g/cm³ in mineral soil indicates:

A. Severe compaction that halts most root growth

B. Loose soil supporting healthy root expansion

C. The optimal bulk density for most tree species

D. A reading typical of undisturbed forest topsoil

51. The most effective long-term way to build soil organic matter in a landscape is to:

A. Till the soil deeply each spring season

B. Apply fine sand annually to the surface

C. Maintain a continuous organic mulch layer

D. Spray hydrogen peroxide across the root zone

52. A composite soil sample is preferred over a single grab sample because it:

A. Is much cheaper for the lab to process

B. Averages variation across the sampled area

C. Requires no specialized sampling equipment

D. Takes much less time to gather in the field

53. Which amendment is most effective for improving clay soil structure over time?

A. A heavy single application of agricultural lime

B. Surface dressings of fine builder's sand

C. Foliar sprays of liquid micronutrients

D. Continuous addition of organic matter

54. Which of the following is NOT a function of mycorrhizal fungi in partnership with trees?

A. Fixing atmospheric nitrogen directly within the tree

B. Extending the absorbing surface of the root system

C. Supplying water and nutrients from the surrounding soil

D. Receiving sugars produced by the host tree's photosynthesis

55. A planting hole for a container-grown tree should be dug at a width of approximately:

A. Exactly the diameter of the root ball

B. Half the diameter of the root ball

C. Two to three times the root ball diameter

D. Ten times the diameter of the root ball

56. A newly planted tree's root flare should be set at what level relative to surrounding grade?

A. Six inches below the surrounding grade

B. At or slightly above the surrounding grade

C. Completely buried beneath several inches of mulch

D. Twelve inches below the existing lawn surface

57. Current best practice for backfill in a planting hole is to use:

A. Sterilized purchased potting mix only

B. Equal parts peat moss and perlite

C. Coarse builder's sand with added lime

D. The native soil excavated from the hole

58. The rule of thumb for tree establishment time is approximately:

A. One year per inch of trunk caliper at planting

B. One year per foot of mature height

C. Six months regardless of caliper size

D. Ten years regardless of caliper size

59. Which of the following is NOT true of staking newly planted trees under current best practice?

A. Staking should be used only when necessary at windy sites

B. Ties should be removed within one growing season in most cases

C. Every newly planted tree requires staking on four sides

D. Unnecessary staking produces weaker trunks over time

60. A circling root discovered inside a container at planting should be:

A. Left intact to avoid damaging fine tips

B. Cut or straightened before placing the tree in the hole

C. Coated with rooting hormone and planted immediately

D. Treated with a commercial wound dressing product

61. Current best practice for handling wire baskets on B&B trees at planting is to:

A. Cut and remove at least the upper portion of the basket

B. Leave the basket completely intact to support the ball

C. Remove the entire basket before lowering into the hole

D. Replace the basket with plastic mesh before planting

62. The most common serious error when planting container-grown trees is:

A. Watering too lightly during the first week after planting

B. Failing to install stakes on all four sides

C. Using only native soil as the backfill material

D. Setting the root ball too deep and burying the flare

63. Watering a newly planted tree should aim to keep the root ball:

A. Saturated continuously for the first month

B. Consistently moist but not saturated

C. Completely dry to force deeper rooting

D. Moist only on the south-facing side of the trunk

64. Fertilization of a newly planted tree during its first growing season is generally:

A. The most important practice for transplant survival

B. Required by most municipal planting specifications

C. Unnecessary and sometimes counterproductive

D. Best applied as a foliar spray to expanding leaves

65. The preferred season for transplanting most deciduous trees is:

A. Dormancy in late fall or early spring

B. Mid-summer during peak active growth

C. Immediately after leaf expansion in spring

D. Any month with adequate irrigation available

66. Advance root pruning before a planned transplant serves primarily to:

A. Reduce the total weight of the future root ball

B. Eliminate any need for future irrigation

C. Prevent suckers from emerging at the trunk

D. Encourage new fibrous roots inside the future ball line

67. Twine tied around the trunk of a B&B tree should be:

A. Tightened further to provide additional stability

B. Removed completely to prevent future girdling

C. Replaced with heavier cord before planting

D. Left in place because it decomposes quickly

68. A balled-and-burlapped tree must be lifted by:

A. Pulling on the burlap from the top of the ball

B. Wrapping the crown with lifting straps

C. Supporting the root ball from underneath

D. Grasping the trunk firmly with two hands

69. All of the following are benefits of mulching a newly planted tree EXCEPT:

A. Conserving moisture in the root zone

B. Moderating soil temperatures over time

C. Suppressing competing weeds near the trunk

D. Supplying the complete nitrogen needs of the tree

70. The depth of a planting hole should:

A. Equal the height from root flare to ball bottom

B. Be at least twice the height of the root ball

C. Include a layer of gravel for drainage at the bottom

D. Reach below the tree's lowest scaffold branches

71. A newly delivered nursery tree should be inspected for:

A. Only the brand name printed on the container

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

C. Only the exact weight on the delivery manifest

D. Only the width of the wire basket and burlap

72. A tree that fails to leaf out the spring after planting most likely suffered from:

A. A foliar disease attacking expanding buds

B. Cold temperatures during normal dormancy

C. Root ball desiccation during handling

D. Inadequate mulch depth at the trunk base

73. Which American National Standard governs tree pruning and maintenance practices?

A. ANSI A300, covering tree care operations

B. ANSI Z133, covering arboricultural safety

C. ANSI Z60.1, covering nursery stock standards

D. ANSI Z89.1, covering head protection equipment

74. A correct pruning cut is placed:

A. Flush with the parent stem for smoothness

B. Six inches beyond the branch collar for safety

C. At the exact midpoint of the branch length

D. Just outside the branch collar and bark ridge

75. Which of the following is NOT a harmful consequence of topping a mature shade tree?

A. Creation of large wounds that cannot close properly

B. Improved structural stability of the canopy

C. Production of weakly attached epicormic sprouts

D. Depletion of the tree's carbohydrate reserves

76. The three-cut method of limb removal is used primarily to:

A. Reduce sawdust accumulation on the worksite

B. Speed up the total cutting time per branch

C. Prevent bark from tearing down the trunk

D. Allow the use of a smaller chainsaw bar

77. The first cut in the three-cut method of limb removal is made:

A. On the underside of the branch beyond the final cut location

B. From above at the exact final cut location

C. Straight down through the top of the branch

D. Parallel to the trunk to score the bark

78. The cleaning pruning objective involves selective removal of:

A. All interior live foliage to thin the crown

B. Every lateral branch crossing another branch

C. The outermost six inches of every branch

D. Dead, dying, diseased, broken, or weak branches

79. A reduction cut differs from a heading cut in that a reduction cut:

A. Is always made with hand pruners only

B. Removes only branches under one inch in diameter

C. Cuts back to a lateral large enough to assume the terminal role

D. Leaves an arbitrary stub regardless of laterals present

80. Structural pruning provides the greatest long-term benefit when performed on:

A. Trees in their final decade of mature life

B. Young trees during the juvenile growth phase

C. Mature trees with established canopies

D. Recently planted trees during establishment

81. The maximum percentage of live foliage that should typically be removed from a mature tree in one session is approximately:

A. 25 to 30 percent during active growth

B. 40 to 50 percent in the dormant season

C. There is no upper limit for healthy mature trees

D. 10 to 15 percent, less for stressed specimens

82. The branch bark ridge is best described as:

A. A raised line of bark on the upper side of a branch union

B. An internal barrier within the heartwood cylinder

C. A layer of dead bark separating heartwood from sapwood

D. The outer corky covering of the entire trunk

83. Lion-tailing is a harmful pruning practice in which:

A. Only deadwood is removed from throughout the canopy

B. The central leader is severed near the top of the trunk

C. Interior foliage is stripped, concentrating weight at branch ends

D. Every crossing branch is removed at its base

84. Pollarding is a traditional pruning technique that requires:

A. Removal of the central leader during establishment

B. Repeated cuts at the same framework points on a schedule

C. Annual application of wound dressing to every cut

D. Complete heading back of the entire canopy

85. The restoration pruning objective applies to trees that have been:

A. Recently planted in their establishment phase

B. Selected for removal at project completion

C. Designated as historic specimens by ordinance

D. Topped, vandalized, or severely storm damaged

86. Research on wound dressings applied to pruning cuts has shown that they:

A. Provide minimal benefit and sometimes slow healing

B. Eliminate any risk of decay organism entry

C. Accelerate compartmentalization across all species

D. Are required by the current ANSI A300 standard

87. In oak wilt regions, oaks should ideally be pruned during:

A. Warm summer months to speed wound closure

B. Wet rainy days when vector beetles are inactive

C. Dormancy to reduce disease transmission risk

D. Any time of year with sterilized tools only

88. Subordination pruning is used to:

A. Eliminate the central leader entirely from the tree

B. Reduce the growth of a competing stem in favor of a leader

C. Remove all epicormic sprouts from the trunk

D. Cut every lateral branch to equal lengths

89. A flush cut damages a tree primarily because it:

A. Removes the branch collar and eliminates Wall 4 tissue

B. Leaves a projecting stub beyond the branch collar

C. Uses excessive force from the cutting tool

D. Allows excess rainwater to enter the wound surface

90. A stub cut damages a tree because it:

A. Stores reserves for future epicormic sprout production

B. Adds useful structural weight to the branch

C. Helps birds nest more securely on the trunk

D. Leaves dead wood that cannot be compartmentalized

91. Bypass pruning blades are preferred over anvil blades for living wood because they:

A. Apply more force at a lower cutting angle

B. Are lighter and reduce operator fatigue

C. Cut cleanly without crushing the stem tissue

D. Can be sharpened without removing them from the tool

92. A pole pruner is most appropriate for:

A. Branches over six inches in diameter overhead

B. Small branches out of reach without climbing

C. Felling small trees on flat terrain only

D. Cutting all lower branches on mature trees

93. A client requests that an arborist thin a mature tree by 50 percent. The professional response is to:

A. Explain that thinning of that magnitude violates accepted standards

B. Comply using exclusively bypass hand pruners

C. Remove only the smallest interior branches available

D. Agree but charge double for the additional work

94. Codominant stems with included bark should ideally be corrected:

A. After the tree reaches full structural maturity

B. By spraying the union with systemic fungicide

C. By removing the tree as a preventive measure

D. Early, while stems and necessary cuts are small

95. The raise pruning objective refers to:

A. Increasing the overall height of the tree canopy

B. Removing lower branches for vertical clearance beneath

C. Lifting the tree with mechanical equipment

D. Raising the soil grade around the tree trunk

96. Disinfecting pruning tools between cuts is most important when:

A. Working on healthy trees during dormant season

B. Performing routine pruning of any healthy tree

C. Pruning trees affected by contagious diseases

D. Using bypass hand pruners on small twigs only

97. A professional pruning specification should include all of the following EXCEPT:

A. The identified pruning objective for the work

B. The percentage of live foliage to be removed

C. The diameter range of cuts to be made

D. The climber's personal stylistic preferences

98. Bypass loppers are most appropriate for branches with a diameter up to approximately:

A. One and a half to two inches

B. Four to six inches across

C. Eight inches in diameter or larger

D. One-quarter of an inch or less only

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

A. Reducing to lower the crown height

B. Raising to provide pedestrian clearance

C. Cleaning to remove dead and weak branches

D. Restoring after previous storm damage

100. The single most important factor in whether a pruning wound closes successfully is:

A. The brand of cutting tool used by the climber

B. The placement of the cut relative to the branch collar

C. The weather conditions during the operation

D. The time of day when the cut is made

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

A. Identify the species and its normal characteristics

B. Apply broad-spectrum fungicide as a precaution

C. Recommend immediate removal of the tree

D. Collect samples for laboratory analysis

102. A "sign" of a tree disease is best defined as:

A. The tree's general response such as wilting

B. A description written in the inspection report

C. A homeowner's complaint about leaf appearance

D. Direct evidence of the causal agent itself

103. A "symptom" of a tree disorder refers to:

A. A visible fruiting body of a fungal pathogen

B. Laboratory confirmation of a specific pathogen

C. The tree's response such as yellowing or wilting

D. Direct identification of an active insect pest

104. A primary tree pest is best described as one that:

A. Is found only in remote forested areas

B. Can kill healthy vigorous trees on its own

C. Cannot reproduce except under drought stress

D. Attacks only trees that are already weakened

105. Emerald ash borer is classified as a primary pest because it:

A. Successfully attacks healthy ash trees of all sizes

B. Was introduced earlier than other wood borers

C. Reproduces only under drought stress conditions

D. Requires bark wounds to enter the host tree

106. Integrated Pest Management is best described as:

A. A specific brand of organic pesticide formulation

B. A complete prohibition on all chemical control

C. A method limited only to biological control agents

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

107. Fire blight is caused by a bacterium and affects which plant family?

A. Pinaceae including pines and firs

B. Sapindaceae including maples

C. Rosaceae including apples and pears

D. Fagaceae including oaks and beeches

108. Oak wilt spreads from tree to tree primarily by:

A. Wind dispersing spores across forests

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

C. Soil nematodes feeding on fine roots

D. Rain splashing from infected leaves

109. A tree with interveinal chlorosis on new leaves while older leaves remain green most likely has:

A. Iron deficiency, often related to high soil pH

B. Nitrogen deficiency affecting mobile nutrients

C. Excess rainfall causing root rot damage

D. Calcium toxicity from previous over-liming

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

A. Iron, an immobile micronutrient

B. Calcium, a structural secondary nutrient

C. Boron, a trace element for cell division

D. Nitrogen, a mobile macronutrient

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 three years after nearby construction most likely results from:

A. A new invasive insect pest in the region

B. Root damage during construction exhausting reserves

C. Normal aging unrelated to the construction

D. Reduced rainfall during the dormant period

113. Anthracnose is best classified as a:

A. Fungal disease producing leaf spots and blotches

B. Bacterial infection of the vascular system

C. Viral disease transmitted by aphid vectors

D. Nutrient disorder limited to new growth

114. Armillaria root rot is confirmed by finding:

A. Orange pustules on the upper surface of leaves

B. Sticky honeydew dripping from twig tips

C. Hollow tunnels carved into the heartwood

D. White mycelial sheets beneath the bark of infected roots

115. Dutch elm disease is spread primarily by:

A. Soil nematodes feeding on elm root systems

B. Elm bark beetles and root grafts between trees

C. Wind blowing spores across long distances

D. Rain splash from infected foliage to others

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

A. Small seedlings growing in container nurseries

B. Very young trees during establishment

C. High-value trees threatened by borers

D. Controlling weeds in the surrounding lawn

117. The phrase "the label is the law" means pesticide labels are:

A. Advisory documents to follow when convenient

B. Expired one year after they are first opened

C. Binding only during the first application

D. Legally enforceable federal documents

118. When a diagnosed disease has no effective treatment, the arborist should:

A. Communicate honestly and recommend appropriate management

B. Apply experimental treatments without informing the owner

C. Recommend removing all nearby trees as a precaution

D. Refuse to discuss the finding with the property owner

119. The Critical Root Zone (CRZ) of a mature tree is commonly calculated as a radius of:

A. Three feet per inch of trunk diameter

B. One foot per inch of trunk diameter at breast height

C. Two feet per inch of trunk diameter at breast height

D. Six inches per inch of trunk diameter

120. Tree protection fencing at a construction site should be placed at:

A. The trunk itself, encircling the bark closely

B. The dripline regardless of tree size or species

C. The CRZ boundary or further from the trunk

D. Half the distance between trunk and dripline

121. Concrete washout within a Tree Protection Zone is harmful primarily because:

A. The high pH of the washwater can sterilize soil

B. The aggregate physically damages absorbing roots

C. The vibration disturbs fine root hairs

D. The cement sets up around root surfaces

122. Raising the soil grade significantly over an existing tree's roots causes:

A. Immediate death within days of the work

B. Stronger anchorage during major storms

C. Gradual decline as buried roots lose oxygen access

D. Improved drainage benefits across the root zone

123. The least damaging method for installing a utility line across a mature tree's root zone is generally:

A. Conventional open-cut trenching at full depth

B. Mechanical auger boring downward from above

C. Surface installation directly on the soil

D. Directional boring beneath the root zone

124. Storage of construction materials within a Tree Protection Zone is:

A. Permitted if the materials are lightweight only

B. Prohibited because of soil compaction and root damage

C. Required to free up other staging areas

D. Allowed only during dry weather conditions

125. A pre-construction tree assessment ideally occurs:

A. Before final design so findings can influence decisions

B. After demolition has begun on the site

C. After foundations have been poured and graded

D. Only if trees show obvious symptoms later

126. An arborist supervising unavoidable root impacts during excavation should:

A. Allow the excavator to tear roots randomly

B. Apply wound sealant to every cut root surface

C. Make clean cuts with sharp tools at the damage line

D. Wait until after excavation to assess damage

127. Post-construction care for a damaged tree should emphasize:

A. Aggressive crown reduction to balance roots

B. Heavy nitrogen fertilization to force new growth

C. Immediate trunk injection with systemic fungicide

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

128. Using the dripline alone as a tree protection boundary is usually inadequate because:

A. Drip patterns change shape during different seasons

B. Actual root systems extend well beyond the dripline

C. Drip lines cannot be enforced legally

D. Drip lines are too difficult to survey accurately

129. Delayed decline following construction damage typically becomes visible:

A. Within hours of the damaging activity ending

B. Only during the next major drought cycle

C. Always on the first anniversary of the construction

D. Months to several years after the triggering event

130. Tree protection fencing on a construction site should be:

A. Sturdy, visible, clearly marked, and maintained throughout

B. Lightweight flagging tape crews can move freely

C. Short stakes spaced widely apart for appearance

D. Painted to match nearby buildings on the lot

131. The single most effective action for protecting a mature tree during construction is:

A. Wrapping the trunk in protective foam padding

B. Pre-construction heavy fertilization of the root zone

C. Excluding all activity from the root zone entirely

D. Reducing the crown to balance expected root losses

132. Lowering the grade around an established tree primarily causes:

A. Improved drainage benefits to deeper roots

B. Direct loss of functional roots with the removed soil

C. Increased nutrient access in newly exposed layers

D. Better wind anchorage from remaining roots

133. A baseline tree condition report prepared before construction primarily serves to:

A. Eliminate any need for later monitoring

B. Be used exclusively for billing the client

C. Satisfy all regulatory requirements automatically

D. Document pre-existing conditions for later comparison

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

A. Should still be monitored for delayed decline

B. Is certain to fail during the next major storm

C. Has fully recovered and needs no further attention

D. Can be safely fertilized heavily without concern

135. Hand or air excavation within a Tree Protection Zone is appropriate when:

A. Conventional trenching would be cheaper for the contractor

B. Speed is the most important consideration on site

C. Roots must be identified and preserved during work

D. The soil is too dry for mechanical equipment

136. A tree that has contacted an energized overhead 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. In formal tree risk assessment, "risk" is defined as:

A. The combination of likelihood of failure and severity of consequences

B. The presence of any visible defect on a mature tree

C. The age of the tree multiplied by its height

D. The total monetary value of the tree at market

138. A Level 2 tree risk assessment is typically:

A. A laboratory analysis of collected wood cores

B. A rapid drive-by screening of street trees

C. A theoretical model based on species alone

D. A detailed visual inspection of an individual tree

139. A Level 1 risk assessment is most appropriate for:

A. Detailed evaluation of a single specimen of concern

B. Rapid screening of large tree populations

C. Advanced internal diagnostics with instruments

D. Post-incident investigation of a failure event

140. Codominant stems with included bark are hazardous because the trapped bark:

A. Emits chemical signals attracting decay organisms

B. Acts as a reservoir for boring insect larvae

C. Prevents formation of a strong structural union

D. Alters the tree's center of gravity over time

141. The presence of a fungal fruiting body on a trunk indicates:

A. A healthy mycorrhizal partnership beneath the bark

B. Normal seasonal shedding of outer bark layers

C. Excess nitrogen from recent fertilization

D. Active decay already established within the tree

142. A target in tree risk assessment is best defined as:

A. A specific branch identified for pruning removal

B. Any person, property, or activity that could be affected by failure

C. A zone where the tree is expected to fall

D. An area of decay that has become externally visible

143. Target occupancy rate refers to:

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

B. The number of trees per acre in a given area

C. The age of structures beneath the canopy

D. The total value of nearby real estate

144. A new lean in a previously upright tree, with fresh soil cracking on the opposite side, indicates:

A. Normal phototropic adjustment toward sunlight

B. A cosmetic change without structural meaning

C. Root plate movement and elevated uprooting risk

D. Seasonal soil movement unrelated to the tree

145. Sounding the trunk with a mallet is useful for:

A. Measuring nitrogen content of the trunk wood

B. Identifying the species from the sound alone

C. Locating overwintering insects in the bark

D. Detecting hollow areas through changes in sound

146. The TRAQ risk matrix combines which two main dimensions?

A. Tree species and trunk diameter at breast height

B. Likelihood of failure and impact with consequences

C. Site drainage and measured soil pH

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

147. A "probable" likelihood of failure in TRAQ means:

A. Failure is likely to occur during the assessment period

B. Failure has already occurred or is imminent

C. Failure is unlikely but not impossible

D. Failure cannot occur under any conditions

148. The "severe" consequence level in TRAQ applies to failures that produce:

A. Minor property damage easily repaired at low cost

B. Moderate damage with no significant injury

C. Catastrophic damage, serious injury, or death

D. No measurable effect on any nearby targets

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

A. The cavity drains rainwater quickly after storms

B. The cavity is smaller than four inches in width

C. The cavity is located above six feet from grade

D. Sufficient intact wood remains around the perimeter

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

A. Only the total weight of the falling part

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

C. Only the distance between tree and structure

D. Only the calendar age of the tree at failure

151. Residual risk refers to:

A. Risk remaining after mitigation has been implemented

B. The cost of insurance premiums on tree property

C. Risk during the mitigation work itself

D. Risk visible only after a tree is removed

152. A professional risk assessment report should include all of the following EXCEPT:

A. The scope of the assessment performed

B. Identified defects and nearby targets

C. A removal recommendation for every tree examined

D. Recommended mitigation and residual risk

153. Level 3 risk assessment tools include:

A. Standard measuring tape and ground observation

B. Resistograph drilling and sonic tomography

C. Color photographs taken from a moving vehicle

D. Basic hand pruners and a small mallet

154. Cabling and bracing systems installed on mature trees:

A. Eliminate all structural risk on the union completely

B. Are required on every mature tree by ANSI A300

C. Need no further inspection after installation

D. Reduce but do not eliminate structural risk

155. When communicating risk findings to a property owner, the arborist should:

A. Use plain language and respect the owner's decisions

B. Use highly technical jargon to establish credibility

C. Recommend only the most expensive option

D. Withhold uncertain information to avoid worry

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

A. Always heal spontaneously on their own

B. Are only found in young trees recently planted

C. Are below ground and not directly observable

D. Never produce any above-ground symptoms

157. Which of the following is NOT a structural defect?

A. A codominant stem with significant included bark

B. A large dead scaffold limb above an occupied area

C. An active vertical crack exposing internal wood

D. A healthy rounded callus around an old small wound

158. Appropriate mitigation for a moderate-risk branch overhanging a driveway is:

A. Removing the entire tree as a preventive measure

B. Reduction pruning to decrease end weight

C. Ignoring the situation until the branch fails

D. Cabling every branch in the entire crown

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

A. ANSI A300 covering pruning practices

B. ANSI Z60.1 covering nursery stock

C. ANSI Z133 covering arboricultural safety requirements

D. OSHA 29 CFR 1926 for general construction

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

A. Ten feet in any direction

B. Three feet in any direction

C. Five feet in any direction

D. Twenty-five feet in any direction

161. A qualified line-clearance arborist differs from an unqualified worker in that the qualified arborist has:

A. General experience in landscape design work

B. A current license to operate a bucket truck

C. Personal ownership of insulated rubber gloves

D. Specialized training in electrical hazards and line clearance

162. A climbing helmet used for arboricultural work must include which feature not required of standard hard hats?

A. A wide brim for blocking direct sunlight

B. A chin strap to retain the helmet during climbing

C. An open face design for peripheral vision

D. Reflective tape covering every external surface

163. Chainsaw-resistant leg protection works by:

A. Activating an electromagnetic brake in the saw

B. Reflecting the moving chain away from skin

C. Containing fibers that clog the chain on contact

D. Producing an audible warning to the operator

164. Hearing protection is generally required under OSHA when noise levels exceed:

A. 85 decibels of typical chainsaw operation

B. 30 decibels of normal conversation

C. 50 decibels of quiet outdoor activity

D. 120 decibels of extreme machinery use

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

A. Only the names of all crew members present

B. Only the lunch break schedule for the crew

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

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

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

A. Only when working trees over 100 feet in height

B. For essentially all climbing operations with a crew

C. Only when electrical hazards are present at the site

D. Only on weekends when EMS is delayed

167. Suspension trauma can develop in a climber who:

A. Remains motionless in a harness for an extended time

B. Ascends a stationary line too quickly to the canopy

C. Uses a harness that fits too tightly at the waist

D. Switches between rope systems during a climb

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

A. The bottom edge of the bar near the powerhead

B. The middle of the cutting bar during use

C. The upper portion of the bar tip

D. The rear handle near the throttle control

169. The chainsaw chain brake is designed to:

A. Slow the chain to a smooth idle when not cutting

B. Stop the chain when activated by kickback or hand

C. Reduce vibration transmitted to the operator

D. Prevent engine flooding during cold-weather starts

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

A. Only fingertip contact for quick release

B. Loose contact to absorb engine vibration

C. Palm contact with thumb alongside the handle

D. The thumb wrapped fully around the front handle

171. Two-handed operation of a chainsaw is:

A. The standard practice for nearly all saw use

B. Required only for felling very large mature trees

C. Optional based on operator preference and skill

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

172. Top-handle chainsaws are designed specifically for:

A. Cutting firewood at a residential woodlot

B. Bucking large logs while standing on the ground

C. Climbing arborist use up in the canopy

D. Felling full-size mature trees in forestry

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

A. Sharpen the chain automatically during use

B. Catch the chain if it breaks during cutting

C. Lubricate the chain during long cuts

D. Secure the chain to the bar during transport

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

A. Half of the rated tensile strength

B. Nine-tenths of the rated tensile strength

C. Equal to the rated tensile strength itself

D. One-tenth of the rated tensile strength

175. Shock loading in rigging refers to:

A. Dynamic forces from a falling piece suddenly caught

B. The static weight of the largest piece handled

C. Initial lifting force applied to a cut piece

D. Electrical charge building up in a dry rope

176. The most effective way to reduce shock loading during a rigging catch is to:

A. Tie the rigging line to a hard anchor with no slip

B. Use the smallest-diameter rope that fits the load

C. Use a friction device to allow controlled slip

D. Position the ground worker beneath the falling piece

177. A block redirecting a rigging load over an anchor experiences approximately:

A. Half the force of the load itself

B. Twice the force of the load itself

C. Exactly the force of the load itself

D. No additional force when properly installed

178. The hinge in a standard felling cut:

A. Must be cut completely through before the tree falls

B. Is needed only for hollow or decayed trees

C. Is formed only by the first notch cut from the front

D. Controls fall direction as the tree commits to falling

179. An escape route during felling operations should:

A. Be planned and cleared before cutting begins

B. Lead directly beneath the falling tree

C. Be improvised at the moment of the actual fall

D. Always be exactly straight behind the feller

180. "Barber chair" in tree felling refers to:

A. A resting position taken between difficult cuts

B. A decorative form intentionally left in the stump

C. Vertical splitting of the trunk during the back cut

D. A specialty chain used for resinous softwood

181. Chipper operators should feed branches into the machine:

A. Tip first while standing directly behind the infeed

B. Butt end first while standing to the side of the infeed

C. Wearing loose clothing for rapid release if needed

D. Only during evening hours to avoid overheating

182. Aerial lift operators near energized lines must:

A. Approach within one foot for efficient pruning

B. Rely on rubber tires to isolate the lift electrically

C. Maintain distance only at the bucket itself

D. Maintain approach distance with both bucket and boom

183. Personal protective equipment should be inspected:

A. Before every use, with damaged items retired

B. Only during annual company safety reviews

C. Only after a known impact or failure event

D. Only by the original equipment manufacturer

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

A. 1,800 pounds for residential climbing work

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

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

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:

A. Refuel quickly without removing the cap completely

B. Keep the saw running at low idle during refueling

C. Refuel with cut-resistant gloves still on the hands

D. Stop the saw and allow it to cool briefly first

188. A first aid kit on a tree care worksite should:

A. Be stored in a vehicle parked off the site

B. Contain only basic over-the-counter medications

C. Be available on site and stocked appropriately

D. Be carried only by the designated safety officer

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

A. Releasing methane gas into the atmosphere

B. Shading surfaces and evapotranspiration cooling

C. Absorbing heat directly through their root systems

D. Reflecting sunlight from waxy leaf surfaces

190. A complete tree inventory records information on:

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 obvious structural defects

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

A. Identify unknown tree species from photographs

B. Predict which specific trees will fail in storms

C. Determine the genetic makeup of urban forests

D. Estimate the dollar value of ecosystem services

192. The trunk formula method of plant appraisal is most appropriate when:

A. The tree has no visible defects of any kind

B. A replacement tree of identical size is available

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

D. The tree is a recently planted nursery specimen

193. A typical tree protection ordinance:

A. Requires permits for removal of protected trees

B. Bans all pruning by private property owners

C. Requires mandatory removal of mature trees over time

D. Applies only to trees planted by the city itself

194. Canopy cover goals are typically expressed as:

A. The number of trees per square mile of city

B. The percentage of land area covered by canopy

C. The total leaf biomass produced annually

D. The average height of street trees in feet

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

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 value of the species today

B. The exact age of the tree being appraised

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 with respect for the owner's decisions

B. Highly technical jargon to display expertise

C. Pressure tactics to close the sale quickly

D. Refusal to provide any pricing estimate

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

A. Increased crime rates in heavily 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. An urban forester advocating for canopy expansion before a budget-focused council should emphasize:

A. The aesthetic preferences of the forestry staff

B. The personal favorite tree species of the mayor

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:

A. Must include only native species from the region

B. Must all be very slow-growing species only

C. Must be purchased from a single approved supplier

D. Protect the community against catastrophic pest loss

PRACTICE EXAM 13 — ANSWER KEY AND EXPLANATIONS

1. C — The vascular cambium is composed of living, actively dividing cells — not dead cells with extractives (which describes heartwood). It produces new xylem inward and new phloem outward and is the most metabolically active layer of a mature trunk. Distinguishing living cambium from dead heartwood is fundamental.

2. A — Phloem transports sugars from sources to sinks but does not conduct water upward — that is the function of xylem. Phloem cells remain alive because sugar transport requires active cellular processes. This division of labor is fundamental to tree physiology.

3. D — The cohesion-tension theory relies entirely on transpiration-generated tension and hydrogen bonding between water molecules, with no active pumping by root cortex cells. No metabolic energy is required from the tree itself. This is why stomatal closure halts water movement entirely.

4. B — There is no Wall 5 in the CODIT model — the model consists of Walls 1, 2, 3, and 4. Wall 1 resists vertical spread, Wall 2 inward spread, Wall 3 lateral spread, and Wall 4 is formed by the cambium after wounding. Wall 4 is the strongest.

5. C — Reserves reach their lowest point in late spring after new leaves have emerged, not their highest. Reserves are consumed by refoliation and begin rebuilding through summer, peaking in autumn. The other statements accurately describe reserve function.

6. A — Respiration consumes sugars to release energy, while photosynthesis produces sugars from carbon dioxide and water. The two are opposite processes in the carbon cycle of the tree. Respiration occurs continuously in every living cell, day and night.

7. D — Stomata regulate gas exchange (CO_2 in, O_2 and water vapor out) but do not anchor the leaf blade. The petiole and vascular tissues provide attachment. Distinguishing structural attachment from physiological functions is essential.

8. B — Heartwood is composed of dead cells and does not conduct water — that is the function of the outer sapwood. Heartwood provides structural support and resists decay through deposited extractives. Sapwood is the functional water-conducting tissue in mature trees.

9. A — Auxin is the plant hormone produced at the shoot tip, transported downward, and responsible for maintaining apical dominance by suppressing lateral bud growth. Removing the leader interrupts auxin flow and releases lateral buds. This is the biological basis for many pruning responses.

10. C — Mycorrhizal fungi do not fix atmospheric nitrogen — that is the role of nitrogen-fixing bacteria. Mycorrhizal fungi extend hyphae to expand absorbing surface area, receive sugars from the tree, and are essential for most tree species. The partnership centers on water and mineral nutrient uptake.

11. B — Most absorbing roots are found in the upper 12 to 18 inches of soil, not concentrated in a deep central taproot. Surface soil offers the best combination of oxygen, water, and nutrients. The deep taproot image is largely incorrect for mature trees.

12. D — Trees do not regenerate or replace damaged wood — they wall off damage with internal barriers through compartmentalization. This is fundamentally different from mammalian wound healing. Trees grow over and around wounds rather than repairing them.

13. A — 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.

14. 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.

15. D — Reaction wood forms in trees exposed to wind flexing — not in rigidly staked trees, which lose this stimulus. Wind stress stimulates the cambium to produce reaction wood and develop greater trunk taper. Rigid staking produces weaker trunks.

16. B — Xylem conducting cells are dead at functional maturity and do not require metabolic respiration to function. They form hollow tubes that transport water through cohesion-tension without active energy input. Phloem and cambium, in contrast, must remain living.

17. A — The vascular cambium adds width to the trunk each year by producing new xylem inward and new phloem outward. Pith, heartwood, and outer bark are not productive tissues. The cambium is the engine of secondary growth.

18. D — Bark does not conduct water upward from roots to leaves — that is the function of xylem in the outer sapwood. Bark protects against mechanical damage, reduces water loss, and blocks pathogens. Distinguishing bark's protective role from xylem's transport role is essential.

19. C — Most absorbing roots are concentrated in the upper 12 to 18 inches of soil, often extending well beyond the dripline. This is where oxygen, water, and nutrients are most available. The deep taproot image is largely incorrect for mature trees.

20. B — *Quercus* (oaks) has alternate leaf arrangement, not opposite. The MAD Horse mnemonic identifies the opposite genera: Maples (*Acer*), Ashes (*Fraxinus*), Dogwoods (*Cornus*), and Horse chestnut (*Aesculus*). Oaks are alternate.

21. D — MAD Horse stands for Maples, Ashes, Dogwoods, and Horse chestnut — the common temperate genera with opposite leaf arrangement. Most other broadleaf trees are alternate. This mnemonic eliminates most identification possibilities at a glance.

22. A — Pointed lobes with bristle tips characterize red oaks, not white oaks. White oaks have rounded lobes without bristles and acorns maturing in a single season. Red oaks have bristle-tipped lobes and two-season acorns.

23. C — 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.

24. B — Cultivar names are written in single quotation marks and are NOT italicized — only the genus and species are italicized. Cultivar names follow the species name in written nomenclature. This typographic convention is set by the international code.

25. A — 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. Hemlock, white pine, and red cedar are all evergreen.

26. D — The 10-20-30 rule limits urban forests to no more than 10% of any single species, 20% of any single genus, and 30% of any single family. The hierarchy protects against threats at each taxonomic level. Dutch elm disease and emerald ash borer illustrate why diversity matters.

27. B — Tree of heaven (*Ailanthus altissima*) is widely classified as a non-native invasive species in much of eastern North America. It escapes cultivation and colonizes disturbed sites aggressively. Redbud, dogwood, and sycamore are all natives.

28. C — Planting a 60-foot tree beneath a 30-foot utility line violates the Right Tree, Right Place principle, which requires matching mature tree characteristics to site conditions. The tree will inevitably conflict with the conductors as it grows. Mature size governs species selection.

29. A — 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.

30. D — Oak, hickory, and beech all have alternate leaf arrangement on their stems. The MAD Horse genera (maple, ash, dogwood, horse chestnut) are opposite, as are catalpa and viburnum. Recognizing alternate vs. opposite narrows identification quickly.

31. B — American sycamore (*Platanus occidentalis*) is distinguished by mottled tan and gray peeling bark and broad palmate leaves. The bark alone often allows identification from a distance. Maples and hickories have very different bark patterns.

32. C — Right Tree, Right Place primarily means matching a tree's mature characteristics — size, form, soil and water needs, tolerance — to the conditions of the planting site. Mature size is particularly important. Ignoring mature dimensions is the most common species selection error.

33. D — *Fraxinus* (the ash genus) belongs to the olive family Oleaceae, which also includes lilacs and forsythias. It is not a member of the pine, rose, or soapberry families. Family-level recognition matters for understanding pest susceptibilities.

34. A — Native species do not have automatic immunity from all local pests and diseases — this is an overstatement. Native species are co-adapted to local climate and ecology, support local wildlife, and generally require lower maintenance. Pest immunity is not guaranteed.

35. B — Leaf margin and venation of new spring foliage are not available in winter because leaves are absent. Winter identification depends on bud shape, twig features, and bark character. Experienced arborists can identify most deciduous trees from twigs alone.

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

37. A — *Acer* (maples) has opposite leaf arrangement and produces paired winged samaras. This combination of features is diagnostic for the genus. Oaks and pines have alternate arrangement; ash has compound leaves.

38. D — *Carya* (hickories) has alternate leaf arrangement, not opposite. The MAD Horse genera with opposite arrangement are *Acer* (maples), *Fraxinus* (ashes), *Cornus* (dogwoods), and *Aesculus* (horse chestnut). Hickories are alternate.

39. B — Red oaks have pointed leaf lobes ending in bristles, with acorns maturing over two growing seasons. White oaks have rounded lobes without bristles and acorns maturing in a single season. These differences are the primary distinction between the two groups.

40. C — Eastern redbud (*Cercis canadensis*) is native to many eastern states. Tree of heaven, Norway maple, and Callery pear are all non-natives introduced from other continents. Some have become invasive in eastern North America.

41. B — Loam contains balanced proportions of sand, silt, and clay — not primarily fine clay particles. 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. D — Each whole number on the pH scale represents a tenfold change in hydrogen ion concentration, not 100-fold. The scale runs from 0 to 14, with 7 as neutral. Values above 7 are alkaline; values below 7 are acidic.

43. A — Cation exchange capacity primarily depends on clay content and organic matter, both of which have negatively charged surfaces that hold cation nutrients. Building organic matter is the only practical way to raise CEC in sandy soils. Higher CEC means better nutrient retention.

44. C — Compaction reduces pore space and the large pores that hold air, starving 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.

45. D — An ideal soil contains approximately 50% pore space by volume, split roughly between water and air, with the remaining 50% as mineral solids and small organic fraction. Pore space is where roots, water, and air reside.

46. B — Iron chlorosis in a pin oak growing in alkaline soil is almost always 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.

47. A — Mulching does not supply all of a tree's nitrogen needs for the year, though it may contribute some as it decomposes. Mulching does conserve moisture, moderate temperature, and suppress weeds. The other three benefits are genuine.

48. C — Drain time of 36 hours indicates inadequate drainage for most tree species. Water that persists more than 12 to 24 hours signals a drainage problem. Site modification or species selection is required before planting.

49. D — Soil texture is essentially permanent because the proportions of sand, silt, and clay cannot be meaningfully altered by any realistic amount of amendment. These proportions are determined by parent material and weathering. Working with existing texture is the only realistic strategy.

50. A — Bulk density above approximately 1.7 g/cm³ indicates severe compaction that halts most root growth. A reading of 1.8 is clearly in the severe range. Values below 1.3 generally indicate good structure.

51. C — Maintaining a continuous organic mulch layer at the soil surface is the most effective long-term practice for building organic matter. Mulch decomposes gradually, enriching the soil without disturbance. Tilling damages existing roots and structure.

52. B — A composite sample averages variation across the area being tested, producing a representative result. A single spot sample may not reflect overall conditions. Proper sampling is the most important step in soil testing — more important than the analysis itself.

53. D — Continuous addition of organic matter is the most effective way to actually improve a clay soil's structure over time. Lime addresses pH but not structure; sand often makes clay soils worse; foliar sprays do not affect soil. Organic matter improves aggregation and pore space.

54. A — Mycorrhizal fungi do not fix atmospheric nitrogen — that is the role of nitrogen-fixing bacteria. Mycorrhizal fungi extend the absorbing surface of the root system, supply water and nutrients, and receive sugars from the tree. The partnership centers on water and mineral uptake.

55. C — Planting holes should be at least two to three times the diameter of the root ball to provide a zone of loosened soil for new roots to expand into. Width matters more than depth. A hole dug just to ball width offers no expansion zone.

56. B — The root flare should sit at or slightly above the surrounding grade at planting. Burying the flare is one of the most common serious planting errors. The correct depth preserves the flare and allows for some settling without burial.

57. D — Current best practice is to backfill with the unamended native soil excavated from the planting hole. Research has shown that heavily amended backfill can produce pot-bound conditions in the ground. Soil improvement is better delivered through surface mulching.

58. A — A widely used rule of thumb is one year of establishment per inch of trunk caliper at planting. A 2-inch caliper tree needs about two growing seasons; a 4-inch caliper tree needs about four. During this period the tree is rebuilding its root system.

59. C — Staking every newly planted tree on four sides is not current best practice — staking should be used only when necessary and removed within one growing season. Unnecessary or prolonged staking produces weaker trunks. The natural flex of the trunk builds strength and taper.

60. B — Circling roots found at planting should be cut or straightened before the tree is placed in the hole. Leaving them in place guarantees they will remain as permanent defects. Correction becomes impossible once the tree is backfilled.

61. A — Current best practice is to cut and remove at least the upper portion of the wire basket after the tree is set in the hole, along with burlap and twine contacting the trunk. Full removal risks damaging the ball; the lower portion can be left in place.

62. D — Planting too deep — burying the root flare — is the most common serious error in planting container-grown trees. The buried flare develops bark decay and girdling root problems that can take years to manifest. Finding and preserving the true flare is essential.

63. B — Establishment watering should keep the root ball and surrounding backfill consistently moist but not saturated. Both extremes are damaging — dry kills through desiccation and saturation kills through suffocation. Checking soil moisture directly is more reliable than fixed schedules.

64. C — Fertilization of a newly planted tree during its first growing season is generally unnecessary and can be counterproductive. A reduced root system cannot effectively use additional nitrogen, and forced top growth exceeds what the roots can support.

65. A — Dormancy — late fall after leaf drop or early spring before bud break — is the preferred transplanting window for most deciduous trees. The tree is not actively transpiring and the stress of root loss is minimized. Summer transplanting carries much higher risk.

66. D — Advance root pruning severs roots at the future root ball line one or more growing seasons before the move. The tree responds by producing new fibrous roots inside the line, which are harvested with the ball and dramatically improve transplant survival.

67. B — Twine tied around the trunk does not decompose reliably and can girdle the trunk as it grows. Synthetic twine in particular persists indefinitely. A single cut at planting prevents years of later damage.

68. C — A balled-and-burlapped tree must be lifted by supporting the root ball from underneath, never by the trunk. Lifting by the trunk can separate the trunk from the ball and destroy the root connection. This is one of the most basic handling rules.

69. D — Mulching does not supply the complete nitrogen needs of a tree, though it may contribute some nitrogen as it decomposes. Mulching does conserve moisture, moderate temperature, and suppress weeds. The other three benefits are genuine.

70. A — Planting hole depth should equal the distance from the root flare to the bottom of the root ball — no deeper. A deeper hole allows the tree to settle and bury the root flare, producing long-term decline. Width can be generous, but depth must be exact.

71. B — Nursery stock should be inspected at delivery for 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. C — A tree that fails to leaf out the spring after planting most likely suffered root ball desiccation during handling. Damaged or dried-out roots cannot support bud break. Inspection at delivery and proper handling prevent most of these failures.

73. A — ANSI A300 is the American National Standard for Tree Care Operations and governs pruning and maintenance practices in the United States. ANSI Z133 addresses worker safety; the two complement each other.

74. D — A proper pruning cut is placed just outside the branch collar and bark ridge so the cambium at the wound edge can form Wall 4. Flush cuts and stubs both damage this mechanism. Correct placement is the biological foundation of good pruning.

75. B — Topping does NOT improve structural stability — it destroys it by producing weakly attached epicormic sprouts. Topping creates large wounds, depletes reserves, and produces weak sprouts. All of these consequences violate the principles of proper pruning.

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

77. A — The first cut is made on the underside of the branch, partway through, several inches beyond the final cut location. This undercut prevents bark tearing when the second cut releases the branch. The sequence is non-negotiable for branches heavy enough to tear bark.

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

79. C — 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. Heading cuts, by contrast, leave arbitrary stubs without regard to laterals.

80. B — Structural pruning during the juvenile phase produces the greatest benefit because small cuts now correct defects that would otherwise require much larger, more damaging cuts decades later. The architectural framework is still being established. Waiting until maturity is far less effective.

81. D — Removing no more than 10 to 15% of live foliage in a single session is the general limit for mature trees, with even less for older or stressed specimens. Heavy pruning depletes reserves and produces weakly attached epicormic sprouts.

82. A — The branch bark ridge is a raised line of bark on the upper surface of a branch union, running outward along the stem from the crotch. It marks the dividing line between stem and branch tissue and is the reference for correct cut placement.

83. C — Lion-tailing strips interior foliage and concentrates weight at the branch ends, creating weaker branches than properly distributed thinning. The pattern removes interior foliage that cushions wind loads. It is explicitly discouraged under current standards.

84. B — Pollarding requires repeated cuts at the same framework points on an ongoing schedule, usually annually or biennially. It must be maintained once begun. Abandoning a pollarded tree produces weakly attached epicormic growth.

85. D — Restoration pruning develops an acceptable crown structure from sprouts that have emerged after topping, vandalism, or severe storm damage. It is a long-term process requiring multiple visits over years. It cannot undo the original damage.

86. A — Research has shown that wound dressings provide minimal benefit and in some cases actually slow compartmentalization by trapping moisture and creating favorable conditions for decay organisms. Current best practice is to leave pruning cuts unsealed.

87. C — In oak wilt regions, pruning of oaks should be postponed until dormancy to reduce the risk of attracting sap-feeding beetle vectors to fresh wounds. Timing is the primary defense. Dormant-season pruning minimizes transmission risk.

88. B — 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.

89. 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 and provides a direct pathway for decay.

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

91. C — Bypass blades cut with a scissor-like action between two curved blades, producing clean cuts on living wood without crushing tissue. Anvil blades press the stem against a flat surface and tend to crush, limiting them to dead material.

92. 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. Whole-tree felling and full-canopy work require different tools.

93. A — 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 thinning of that magnitude violates accepted standards and propose an appropriate alternative.

94. D — 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 and more damaging cuts.

95. B — The raise objective refers to selective removal of lower branches to provide vertical clearance beneath the crown for pedestrians, vehicles, or sight lines. Raising should be done gradually on young trees to avoid producing a disproportionate crown.

96. C — Tool disinfection is most important when pruning trees with known contagious diseases such as fire blight. Disease organisms can be transferred between cuts on contaminated blades. For routine work on healthy trees, disinfection is not generally required.

97. D — A professional pruning specification should include the identified objective, the percentage of foliage to be removed, and the diameter range of cuts. The climber's personal preferences are not part of a professional specification — clear specifications protect tree, client, and arborist.

98. A — Bypass loppers extend the principle of hand pruners to branches up to approximately one and a half to two inches in diameter, using long handles for mechanical advantage. Smaller branches are better handled by hand pruners.

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

100. B — The placement of the cut relative to the branch collar is the single most important factor in whether a pruning wound closes successfully. Correct placement preserves the cambium that forms Wall 4; incorrect placement eliminates it.

101. A — 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. D — A sign is direct evidence of the causal agent itself — fungal fruiting bodies, visible insects, or confirmed pathogens. Signs are more reliable than symptoms because they point directly to a cause rather than to the tree's response.

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

105. A — Emerald ash borer is classified as a primary pest because it can successfully attack and kill healthy ash trees of all sizes. This distinguishes it from most native wood borers and is why it has devastated ash populations across North America.

106. D — 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 when chemical control is warranted.

107. C — 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. B — 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. A — Iron is an immobile nutrient, and deficiency appears first on new leaves as interveinal chlorosis with green veins. The tree cannot translocate iron from older foliage. In landscape settings, this is almost always a pH-related availability problem.

110. D — 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 on a mature tree 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 typically appear one to three years later when reserves are exhausted.

113. A — Anthracnose is a general term for several fungal leaf diseases that produce 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. C — 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 translocation with low environmental exposure.

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

118. A — 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 diameter at breast height. A 24-inch DBH tree has a 24-foot radius CRZ. This formula is the standard reference in ISA Best Management Practices.

120. C — Tree protection fencing should be placed at the calculated CRZ boundary or further from the trunk. Placing fencing at the dripline or closer leaves significant root area exposed. The CRZ formula produces a more defensible boundary.

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

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

124. B — Storage of construction materials within a TPZ is prohibited because stockpiles compact the underlying soil under their weight and smother roots. This is one of the standard prohibitions enforced by TPZ fencing.

125. A — 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. C — An arborist supervising unavoidable root impacts should make clean cuts with sharp tools at the damage line before excavation begins. Clean cuts produce better wound responses than the tearing and crushing from unprepared excavation.

127. D — 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. B — 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.

129. D — 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. Monitoring should continue for at least three to five growing seasons.

130. A — Tree protection fencing should be sturdy, visible (brightly colored, at least four feet tall), clearly marked with signage, and maintained throughout construction. Flimsy flagging is routinely moved or ignored.

131. C — 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. A — 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. C — 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 and 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, including trunk and lower branches.

137. A — 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 — 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 such as a mallet and probe. It is the standard level for trees of concern.

139. B — 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.

140. C — Included bark between codominant stems prevents the formation of a strong structural union. The attachment becomes progressively weaker as the stems grow, and catastrophic splitting can occur without warning.

141. D — 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.

142. B — 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.

143. A — Target occupancy rate formalizes 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.

144. 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.

145. D — 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 visually.

146. B — 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.

147. A — 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.

148. C — 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.

149. D — 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.

150. 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 in isolation cannot predict severity.

151. A — 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.

152. C — A professional report should document scope, defects, targets, mitigation, and residual risk — but not a removal recommendation for every tree. Recommendations must be proportional to actual risk. Blanket removal recommendations damage professional credibility.

153. 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 where Level 2 has left significant uncertainty.

154. D — 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. A — 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. C — 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. D — 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 other options are all genuine defects.

158. B — Reduction pruning to decrease end weight on an overextended branch is a standard mitigation for moderate risk from specific branch defects over targets. It addresses the identified defect without removing the entire tree.

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

160. A — 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. D — 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. B — 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. C — 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. A — 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. D — 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. B — 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. A — Suspension trauma develops when a climber remains motionless in a harness for an extended period, as reduced venous return causes blood to pool in the legs. It can become life-threatening within 30 minutes.

168. C — 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. D — 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. A — 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. C — 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. B — 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. D — 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. A — 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. B — 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. D — 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. A — 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. B — 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. D — 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. A — 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. D — 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. C — 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. A — 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. B — 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 and communicating progress to the public.

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 loss when species-, genus-, or family-specific pests arrive. Dutch elm disease and emerald ash borer illustrate why diversity matters.