PRACTICE EXAM 3: ISA CERTIFIED ARBORIST SIMULATION

QUESTIONS 1–200

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

1. Which of the following is NOT a function of xylem tissue in a tree?

A. Upward conduction of water from roots

B. Transport of dissolved mineral nutrients

C. Structural support within the woody stem

D. Transport of sugars from leaves to roots

2. Which tissue lies directly inside the vascular cambium of a woody stem?

A. Sapwood composed of functional xylem

B. Inner bark composed of living phloem

C. Outer corky layer of the rhytidome

D. Thin cuticle covering the trunk surface

3. Glucose produced during photosynthesis is primarily stored in trees as:

A. Cellulose locked within cell walls

B. Lignin deposited in the heartwood

C. Starch held in parenchyma cells

D. Sucrose dissolved in the xylem sap

4. The primary pigment responsible for capturing light energy in tree leaves is:

A. Carotenoid producing yellow tones

B. Chlorophyll in leaf chloroplasts

C. Anthocyanin producing red colors

D. Xanthophyll producing orange tones

5. Approximately what percentage of a mature tree's total volume consists of living cells?

A. Less than ten percent

B. About twenty-five percent

C. About fifty percent

D. More than seventy-five percent

6. Which CODIT wall is formed by the vascular cambium after a wound occurs?

A. Wall 1 resisting vertical spread

B. Wall 2 resisting inward spread

C. Wall 3 resisting lateral spread

D. Wall 4 resisting outward spread

7. The conducting elements of phloem tissue in a tree are called:

A. Tracheids found in softwoods

B. Vessel members found in hardwoods

C. Sieve tube members and companion cells

D. Xylem fibers at the growth ring boundary

8. Which element used by trees is obtained primarily from the atmosphere rather than the soil?

A. Potassium needed for osmotic balance

B. Carbon incorporated through photosynthesis

C. Phosphorus needed for energy transfer

D. Magnesium needed for chlorophyll

9. The protective outer layer of dead corky cells on a mature trunk is known as the:

A. Vascular cambium producing new cells

B. Sapwood conducting water upward

C. Phloem transporting sugars downward

D. Rhytidome formed from dead bark

10. Turgor pressure inside a living plant cell is primarily maintained by:

A. Water held within the central vacuole

B. Air trapped in intercellular spaces

C. Protein fibers within the cell wall

D. Sugars accumulating in the cytoplasm

11. A "mast year" in forestry and arboriculture refers to:

A. A year of exceptional height growth in young trees

B. A year when fall color arrives unusually early

C. A year of unusually heavy fruit or seed production

D. A year when no new twig growth occurs

12. Respiration in trees consumes oxygen in order to:

A. Convert carbon dioxide into simple sugars

B. Release energy stored in carbohydrates

C. Build new cellulose for developing cell walls

D. Produce chlorophyll for use in chloroplasts

13. Which of the following best describes the direction of flow in phloem?

A. Always upward from roots toward leaves

B. Always downward from leaves toward roots

C. Exclusively outward from trunk to bark

D. From source to sink, which may be any direction

14. The process by which water evaporates from leaf surfaces and draws more water upward through the xylem is called:

A. Transpiration driven by leaf evaporation

B. Condensation of vapor on leaf surfaces

C. Translocation of sugars through phloem

D. Osmosis across root cell membranes

15. A single annual growth ring in a temperate tree consists of:

A. One complete layer of outer bark material

B. Earlywood and latewood produced in one season

C. Two layers of phloem added during the season

D. A ring of heartwood near the pith center

16. Apical dominance in a young tree is maintained primarily by:

A. Gravitational pull acting on lower branches

B. Competition for water between upper and lower buds

C. Hormones from the shoot tip suppressing lateral buds

D. Mechanical pressure between expanding stem tissues

17. The plant hormone most responsible for apical dominance is:

A. Auxin produced at shoot tips

B. Cytokinin produced in root tissues

C. Abscisic acid regulating dormancy

D. Ethylene produced in ripening fruit

18. Which of the following statements about tree root distribution is correct?

A. Most absorbing roots grow more than three feet deep

B. A taproot remains dominant throughout the life of most trees

C. Roots are structurally identical to aboveground branches

D. Most absorbing roots are found in the upper eighteen inches

19. Adventitious roots are roots that:

A. Grow only in response to mycorrhizal presence

B. Arise from stems or other non-root tissues

C. Develop exclusively from seed radicles

D. Are produced only by coniferous tree species

20. Deciduous trees shed their leaves in autumn primarily as a strategy to:

A. Reduce the total weight on scaffold branches

B. Eliminate accumulated insect populations in the crown

C. Conserve water and survive freezing temperatures

D. Reduce nitrogen loss to the surrounding soil

21. Which of the following statements about conifer needles is correct?

A. Most conifer needles are evergreen and persist several years

B. All conifers shed their needles each autumn like deciduous trees

C. Needles contain no chlorophyll during winter dormancy

D. Needles cannot photosynthesize at any time in cold weather

22. Epicormic shoots are best described as:

A. Roots that have grown upward into the trunk

B. Branches produced only at the top of the crown

C. Shoots arising from seeds germinating in the canopy

D. Shoots arising from dormant buds on older bark

23. The genus *Quercus* includes trees commonly known as:

A. Maples with paired samara fruit

B. Oaks bearing acorn fruit

C. Ashes with single samara fruit

D. Birches with winged nutlets

24. Members of the family Fagaceae include which group of trees?

A. Maples and boxelders

B. Pines and spruces

C. Oaks and beeches

D. Roses and apples

25. A tree with opposite leaves and paired winged samaras most likely belongs to the genus:

A. *Quercus* in the beech family

B. *Pinus* in the pine family

C. *Ulmus* in the elm family

D. *Acer* in the maple family

26. Which of the following groups have needle-like rather than broad leaves?

A. Conifers including pines and spruces

B. Angiosperms including oaks and maples

C. Palms including date and coconut

D. Cycads including sago and cardboard

27. The correct written form of a scientific name is:

A. acer rubrum entirely in lowercase

B. ACER RUBRUM in full capitals

C. *Acer rubrum* with italics applied

D. *acer Rubrum* with reversed case

28. Cultivar names in written text are formatted using:

A. Italicized lowercase letters

B. Single quotation marks without italics

C. All capital letters without any quotes

D. Parentheses following the species name

29. Which of the following is a deciduous conifer?

A. Bald cypress in the genus *Taxodium*

B. Eastern white pine in the genus *Pinus*

C. Blue spruce in the genus *Picea*

D. Eastern red cedar in the genus *Juniperus*

30. Which of these species has the longest needles?

A. Eastern white pine averaging five inches

B. Norway spruce averaging one inch

C. Eastern hemlock averaging half an inch

D. Longleaf pine averaging twelve inches

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

A. Shagbark hickory in the walnut family

B. American sycamore in the plane family

C. White oak in the beech family

D. Norway maple in the soapberry family

32. Which of these species is widely considered invasive across much of the eastern United States?

A. Eastern redbud native to many states

B. Flowering dogwood native to forests

C. Norway maple introduced from Europe

D. American holly native to eastern forests

33. The terms "red oak group" and "white oak group" distinguish oaks primarily by:

A. Leaf lobe tips and acorn maturation time

B. Trunk bark color visible on mature trees

C. Geographic range across North America

D. Whether flowers appear in spring or autumn

34. The fruit of a maple is technically classified as a:

A. Drupe with a fleshy outer layer

B. Nut with a hardened exterior shell

C. Pome with a fleshy fruit wall

D. Samara with a papery wing

35. A compound leaf with leaflets radiating from a single attachment point is described as:

A. Pinnately compound along a rachis

B. Bipinnately compound with secondary branches

C. Palmately compound from one point

D. Decurrent along the stem surface

36. Which of the following groups of trees all have opposite leaf arrangement?

A. Oak, hickory, and walnut in mixed stands

B. Maple, ash, and dogwood native to the east

C. Birch, cherry, and beech in forest settings

D. Pine, spruce, and fir in high elevations

37. The Right Tree, Right Place principle is best summarized as:

A. Planting only native species on every site

B. Using the largest nursery stock available

C. Avoiding all pruning during establishment

D. Matching a tree's mature characteristics to the site

38. A tree that produces acorns belongs to the genus:

A. *Acer* with winged fruits

B. *Fagus* with beech nuts

C. *Quercus* with acorn cups

D. *Ulmus* with flat samaras

39. The 10-20-30 rule applies maximum percentages at which three classification levels?

A. Order, family, and genus

B. Species, genus, and family

C. Cultivar, species, and genus

D. Genus, subfamily, and order

40. A tree planted directly under a 25-foot distribution power line should have a mature height that is:

A. Safely below the conductor height

B. Equal to the conductor height exactly

C. Slightly above the conductor height

D. Double the conductor height for shade

41. The three particle size classes that define soil texture are:

A. Gravel, sand, and silt in descending order

B. Clay, loam, and sand as defined by feel

C. Organic, mineral, and pore space content

D. Sand, silt, and clay in descending order

42. A loam soil contains approximately balanced physical contributions from:

A. Only sand and clay without silt

B. Sand, silt, and clay combined

C. Gravel and organic matter together

D. Clay and humus without sand

43. Soil pH is measured on a scale ranging from:

A. 0 to 7 with neutral at zero

B. 1 to 10 with neutral at five

C. 0 to 14 with neutral at seven

D. 0 to 20 with neutral at ten

44. Most tree species grow best in soils with pH between:

A. 6.0 and 7.0 slightly acidic to neutral

B. 4.0 and 5.0 strongly acidic range

C. 8.5 and 9.5 moderately alkaline range

D. 10.0 and 11.0 strongly alkaline range

45. Cation exchange capacity of a soil primarily depends on:

A. Total sand content in the profile

B. Annual rainfall received at the site

C. Depth to the underlying bedrock layer

D. Clay content and organic matter

46. Soil compaction damages tree roots primarily by:

A. Increasing soil temperatures to lethal levels

B. Reducing oxygen available for root respiration

C. Concentrating salts in the root zone

D. Raising soil pH to toxic levels

47. An ideal mineral soil contains approximately what percentage of pore space by volume?

A. Ten percent split evenly

B. Twenty-five percent mostly water

C. Fifty percent split between water and air

D. Seventy-five percent mostly air

48. A proper mulch layer around a landscape tree should be:

A. Two to four inches deep, kept off the trunk

B. Eight to ten inches piled against the trunk

C. A thin dusting across the full lawn area

D. Replaced with plastic sheeting for best effect

49. A soil with bulk density greater than approximately 1.7 grams per cubic centimeter is typically:

A. Ideal for active root growth

B. Loose and well aerated

C. Rich in organic matter

D. Severely compacted

50. Mycorrhizal fungi benefit their host tree primarily by:

A. Fixing atmospheric nitrogen within root cells

B. Extending the effective absorbing surface area

C. Protecting roots with a waxy outer coating

D. Storing carbohydrates the tree cannot use

51. Nitrogen in the soil is most commonly available to plant roots in the forms of:

A. Elemental nitrogen gas in pore space

B. Pure ammonia gas released from manure

C. Nitrate and ammonium ion in solution

D. Crystalline urea on the soil surface

52. A soil test sample for an individual tree should ideally consist of:

A. A composite of subsamples from the root zone

B. A single grab sample taken next to the trunk

C. A sample from lawn areas many feet away

D. A sample taken only from the soil surface

53. A soil percolation (perc) test measures:

A. The color of the subsoil below the topsoil

B. The amount of organic matter in the profile

C. The population of living earthworms present

D. How quickly water drains from a test hole

54. Soil texture is considered essentially permanent because:

A. Any amendments wash away with the next rain

B. Proportions of sand, silt, and clay cannot be practically altered

C. Testing laboratories refuse to recommend changes

D. Fungal networks restore the original texture quickly

55. The planting hole for a new tree should be dug to a width of:

A. Half the diameter of the root ball

B. Exactly 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. The depth of a planting hole should:

A. Equal the distance from root flare to ball bottom

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

C. Reach well below the tree's first branches

D. Include a loose gravel layer under the ball

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

A. Sterilized potting soil purchased from a garden center

B. Coarse builder's sand mixed with ground lime

C. Composted bark with added bone meal

D. Native soil excavated from the planting hole

58. Wire baskets and twine on B&B root balls are removed from the upper portion to:

A. Reduce the total weight of the backfill

B. Prevent future girdling of the trunk

C. Recycle the metal components for scrap

D. Reduce the risk of cutting injury later

59. The root flare on a newly planted tree should sit:

A. Well below the surrounding grade

B. Deep enough to stabilize the trunk

C. At or slightly above the grade

D. Completely buried beneath mulch

60. A newly planted tree typically requires establishment time equal to:

A. Approximately one year per caliper inch

B. About two weeks from the planting date

C. Exactly six months regardless of size

D. A full decade for most deciduous species

61. Staking of a newly planted tree should generally be:

A. Permanent support throughout the tree's life

B. Required on every tree regardless of species

C. Tight enough to prevent any trunk movement

D. Temporary and removed within one growing season

62. A tree planted too deeply is most likely to show:

A. Accelerated growth in the first season

B. Improved drought tolerance in dry years

C. Gradual decline from a buried root flare

D. Stronger resistance to wind throw events

63. Container-grown trees with circling roots should be treated at planting by:

A. Leaving the root ball completely undisturbed

B. Slicing the roots vertically or straightening them

C. Coating the roots with rooting hormone paste

D. Returning the tree to the nursery for credit

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

A. Generally unnecessary and sometimes counterproductive

B. Required at high rates to ensure survival

C. The single most important post-planting practice

D. Always applied as a foliar spray to leaves

65. A balled-and-burlapped tree should be moved and lifted by:

A. Grasping the trunk firmly with two gloved hands

B. Pulling upward on the burlap wrap from the top

C. Looping a rope around the crown branches

D. Supporting the root ball from underneath

66. The best season for transplanting most deciduous trees is:

A. Mid-summer during the peak growth period

B. Immediately after leaf expansion each spring

C. Dormant season in late fall or early spring

D. Any month of the year with daily irrigation

67. Advance root pruning prior to a planned transplant is performed to:

A. Eliminate any need for supplemental water after the move

B. Encourage new fibrous roots inside the future root ball

C. Prevent root suckers from developing around the base

D. Reduce the total cost of the transplant operation

68. The most common serious error made at planting is:

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

B. Using too much native soil as the backfill material

C. Failing to install a stake on every side of the tree

D. Watering too infrequently during the first week

69. The primary purpose of mulching a newly planted tree is to:

A. Supply large amounts of nitrogen to the root zone

B. Kill competing weeds through chemical effect

C. Shelter beneficial insects during establishment

D. Conserve moisture and moderate soil temperature

70. Which of these is most important to check when accepting nursery tree delivery?

A. Price per gallon of container volume ordered

B. The manufacturer of the shipping container used

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

D. Exact weight of the root ball reported by shipper

71. Watering a newly planted tree should:

A. Apply small amounts to the lawn area frequently

B. Keep the root ball consistently moist but not saturated

C. Flood the entire landscape weekly beyond the dripline

D. Be withheld entirely during the first month

72. The ANSI standard governing nursery stock quality in the United States is:

A. ANSI Z89.1 for head protection

B. ANSI Z133 for arboricultural safety

C. ANSI Z60.1 for nursery stock

D. ANSI A300 for pruning operations

73. The ANSI standard governing tree pruning operations in the United States is:

A. ANSI Z60.1 for nursery stock

B. ANSI Z133 for worker safety

C. ANSI Z89.1 for head protection

D. ANSI A300 for tree care practices

74. A correct pruning cut is placed:

A. Just outside the branch collar and bark ridge

B. Flush with the parent stem surface

C. Six inches beyond the branch collar for clearance

D. Midway between the branch tip and parent stem

75. Topping of mature shade trees is best described as:

A. A recommended storm risk reduction technique

B. Standard practice around utility lines

C. A harmful and unacceptable pruning practice

D. Required by most tree protection ordinances

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

A. Overheating of the chainsaw during extended cuts

B. Bark tearing down the trunk as the branch falls

C. Sap flow staining the climbing rope below

D. Dulling of the cutting tool during the job

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

A. On the underside of the branch, out beyond the final cut

B. Directly at the branch collar from above the branch

C. Straight down through the top of the branch first

D. Parallel to the trunk to score the bark surface

78. Which of these is a primary pruning objective recognized by ANSI A300?

A. Top to reduce overall tree height

B. Strip to remove all lower branches

C. Lion-tail to reduce interior foliage

D. Clean to remove dead and weak wood

79. The "raise" pruning objective refers to:

A. Lifting a tree with mechanical equipment

B. Increasing the overall height of the crown

C. Providing vertical clearance under the crown

D. Raising the soil grade at the trunk base

80. A reduction cut removes a branch back to:

A. A point halfway along the branch length

B. A lateral branch large enough to assume the terminal role

C. An arbitrary stub beyond any lateral branch

D. The outermost visible bud on the branch

81. Structural pruning delivers the greatest long-term benefit when performed on:

A. Young trees in the juvenile growth phase

B. Mature trees with established crown architecture

C. Senescent trees in their final years of life

D. Newly planted trees during establishment

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

A. Forty percent in a single treatment

B. Twenty-five percent during active growth

C. Ten to fifteen percent, with less for stressed trees

D. Less than two percent annually

83. Which of the following is explicitly prohibited by ANSI A300?

A. Cleaning dead wood from a mature oak

B. Topping a mature shade tree

C. Reducing an overextended scaffold branch

D. Raising a young tree's lower limbs

84. Bypass pruners differ from anvil pruners in that bypass pruners:

A. Are always battery-powered at the factory

B. Can only cut dead or dry wood cleanly

C. Use a single blade striking a flat surface

D. Use two curved blades passing each other

85. A stub cut leaves a projecting piece of wood that:

A. Cannot be compartmentalized and invites decay

B. Serves as a helpful support for new buds

C. Heals faster than a properly placed cut

D. Produces vigorous lateral growth afterward

86. A flush cut damages a tree primarily by:

A. Leaving a dead stub that blocks sun

B. Increasing moisture retention at the cut site

C. Removing the branch collar and Wall 4 tissue

D. Applying excessive force to the cutting tool

87. Lion-tailing is a harmful pruning practice because it:

A. Removes only branches under one inch in diameter

B. Uses only hand saws rather than chainsaws

C. Creates cuts too small to compartmentalize

D. Strips interior foliage and concentrates weight at tips

88. Pollarding is a traditional technique that requires:

A. Removal of the central leader early in the tree's life

B. Repeated pruning back to the same framework points

C. No further maintenance once initially established

D. Annual topping of the entire canopy to a uniform height

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

A. Topped, vandalized, or severely storm-damaged

B. Recently planted in their establishment phase

C. Selected for removal at project completion

D. Designated as heritage trees by local ordinance

90. Research on tree wound dressings has shown that they typically:

A. Double the rate of wound closure across species

B. Kill all fungal spores near a pruning cut

C. Provide minimal benefit to wound healing

D. Are required by the current ANSI A300 standard

91. Current best practice for pruning oaks in regions with oak wilt is to:

A. Prune during warm weather to speed wound closure

B. Use wound dressing on every cut made year-round

C. Prune only on rainy days to reduce beetle activity

D. Postpone pruning until the dormant season

92. The branch bark ridge is located:

A. On the underside of a branch union only

B. On the upper surface of a branch union

C. Inside the pith at the center of a stem

D. Directly beneath the outer bark surface

93. Which tool is most appropriate for cuts on branches up to about one inch in diameter?

A. Bypass hand pruners for living wood

B. A large rear-handle chainsaw for speed

C. A pole chainsaw operated from below

D. A hatchet or small axe blow

94. Which tool is best suited for cuts between one and two inches in diameter?

A. Bypass hand pruners used one-handed

B. A large rear-handle chainsaw with chap protection

C. Bypass loppers with long handles

D. A standard handsaw at full length

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

A. The identified pruning objective

B. The percentage of live foliage to remove

C. Minimum and maximum cut diameters

D. The climber's personal preferences

96. Which of the following is NOT a primary pruning objective in ANSI A300?

A. Strip to remove all lower limbs

B. Raise for vertical clearance under the crown

C. Reduce for height or spread decrease

D. Restore after damage or topping

97. Codominant stems with included bark are best corrected:

A. Only after the tree reaches full maturity

B. Early, while the stems and needed cuts are small

C. Through cabling and bracing systems alone

D. By removing the tree as a preventive measure

98. Pruning tools should be sharpened:

A. Once per calendar month regardless of use

B. Only when they fail to cut any material

C. Regularly, often at the start of each workday

D. Never, because sharpening weakens the blade

99. Disinfection of pruning tools between cuts is most important when:

A. Pruning healthy trees in routine maintenance

B. Working during the dormant winter season

C. Using hand pruners on very small twigs

D. Pruning trees with known diseases such as fire blight

100. Removing a dead branch from a mature tree is part of which pruning objective?

A. Raise to provide pedestrian clearance

B. Clean to remove dead and weak wood

C. Reduce to lower the overall crown height

D. Restore after previous damage to the tree

101. The first step in a systematic diagnostic process for a declining tree is to:

A. Apply broad-spectrum fungicide as a precaution

B. Collect soil samples for laboratory analysis

C. Identify the species and its normal characteristics

D. Take photographs of the entire tree canopy

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

A. Direct evidence of the pathogen itself, such as fruiting bodies

B. The tree's physiological response such as wilting

C. A symptom of general decline visible from a distance

D. A property owner's complaint about appearance

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

A. A visible fruiting body of a fungal pathogen

B. A nest of active wood-boring insects

C. Laboratory confirmation of a specific agent

D. The tree's response, such as leaf yellowing or wilting

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

A. Attacks only trees that are already weakened

B. Can kill healthy vigorous trees on its own

C. Cannot reproduce without a specific stress condition

D. Is only found in forested rural areas

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

A. Successfully attacks healthy ash trees of all sizes

B. Reproduces only under drought conditions

C. Requires bark wounds to enter the tree

D. Is a secondary pest in all its native regions

106. Integrated Pest Management is best described as:

A. A specific branded pesticide product

B. A complete prohibition on chemical treatments

C. A decision framework using multiple tactics

D. A biological control method used alone

107. Fire blight is caused by a:

A. Wood-decay fungus invading pruning wounds

B. Bacterium in the genus *Erwinia*

C. Virus transmitted by sucking aphids

D. Root-feeding nematode in sandy soils

108. Oak wilt is spread from tree to tree primarily by:

A. Airborne spores from decaying logs nearby

B. Root contact between unrelated species

C. Irrigation water from shared wells

D. Root grafts and sap-feeding beetles

109. Interveinal chlorosis on new growth with green veins typically indicates deficiency of:

A. Nitrogen, a mobile macronutrient

B. Potassium, a mobile macronutrient

C. Iron, an immobile micronutrient

D. Calcium, a structural secondary nutrient

110. Uniform yellowing beginning on older inner leaves first typically indicates deficiency of:

A. Nitrogen, a mobile macronutrient

B. Iron, an immobile micronutrient

C. Manganese, an immobile micronutrient

D. Boron, a trace micronutrient

111. Cupped and distorted new leaves are a classic sign of damage from:

A. Oak wilt vascular disease infection

B. Spider mite feeding on new foliage

C. Anthracnose leaf infection

D. Phenoxy herbicide exposure

112. Delayed decline years after construction activity typically results from:

A. A new foliar disease unrelated to the work

B. Normal aging of a mature specimen

C. Root damage suffered during construction

D. Reduced rainfall during the dormant period

113. Anthracnose is classified as a:

A. Viral disease transmitted by aphid vectors

B. Fungal disease producing leaf spots and blotches

C. Bacterial infection of the vascular system

D. Nutrient disorder affecting new growth only

114. Armillaria root rot produces which characteristic diagnostic sign?

A. White mycelial sheets beneath infected bark

B. Purple lesions on expanding new leaves

C. Orange pustules on foliage undersides

D. Sticky honeydew dripping from twigs

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

A. Wind-blown spores across open terrain

B. Soil-borne nematodes feeding on elm roots

C. Rain splash from infected foliage

D. Elm bark beetles and root grafts

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

A. Small seedlings growing in a nursery

B. High-value trees threatened by borers

C. Viral diseases with no available treatment

D. Controlling weeds growing in the lawn

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

A. Advisory documents to be followed when convenient

B. Expired after one year of open storage

C. Legally enforceable federal documents

D. Only binding during the first application

118. Which of the following is NOT a component of Integrated Pest Management?

A. Maximum use of chemicals regardless of thresholds

B. Regular monitoring and pest identification

C. Establishment of action thresholds before treatment

D. Integrated use of multiple control tactics

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

A. Six inches per inch of trunk diameter

B. Two feet per inch of trunk diameter

C. Three feet per inch of trunk diameter

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

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

A. The trunk itself, hugging the bark

B. The CRZ boundary or further from the trunk

C. The canopy dripline regardless of CRZ

D. Five feet from the nearest building

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

A. Adds calcium that benefits root growth

B. Increases soil drainage temporarily

C. Has high pH that can sterilize the soil

D. Provides structural support to the tree

122. Raising the soil grade significantly around a mature tree typically causes:

A. Gradual decline as roots lose access to oxygen

B. Increased vigor and faster shoot growth

C. Stronger wind resistance during storms

D. Better resistance to root rot diseases

123. The least damaging method for running a utility line across a root zone is generally:

A. Open-cut trenching through the CRZ

B. Surface laying directly on the soil

C. Mechanical auger boring from above

D. Directional boring beneath the root zone

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

A. Allowed if materials are lightweight only

B. Prohibited because of compaction and root damage

C. Encouraged to simplify contractor logistics

D. Required by certain ANSI tree care standards

125. A pre-construction tree assessment ideally occurs:

A. After demolition work has already started

B. Immediately after construction is completed

C. Before final design decisions are locked in

D. Only if trees show obvious damage later

126. Deliberate root pruning ahead of unavoidable excavation should be performed with:

A. Blunt backhoe buckets to crush roots cleanly

B. Chemical applications to dissolve roots

C. Fire to burn the roots at the line

D. Sharp tools to make clean cuts in advance

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

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

B. Heavy nitrogen fertilization to force growth

C. Severe crown reduction to balance roots

D. Immediate systemic fungicide applications

128. The dripline of a mature tree is usually an inadequate CRZ boundary because:

A. Drip patterns vary with every rainstorm

B. Actual root systems extend beyond the dripline

C. Drip measurements require surveying equipment

D. Drip coverage excludes the trunk entirely

129. Delayed decline following construction damage typically becomes visible:

A. Within hours of the damaging activity

B. On the first day of the following winter

C. Months to several years after the event

D. Exactly two years after construction ends

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

A. Sturdy, visible, clearly marked, and maintained

B. Easily removable whenever convenient

C. Painted to match nearby buildings

D. Placed only six inches from the trunk

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

A. Pre-construction heavy fertilization of the root zone

B. Wrapping the trunk with protective foam

C. Crown reduction pruning before work begins

D. Excluding all activity from the root zone

132. Lowering the soil grade around a mature tree causes:

A. Improved drainage for remaining roots

B. Direct loss of roots along with removed soil

C. Better anchorage in the remaining profile

D. Enhanced access to deeper nutrient pools

133. A baseline tree condition report prepared before construction:

A. Eliminates any need for later monitoring

B. Satisfies all regulatory requirements alone

C. Documents pre-existing conditions for later comparison

D. Is used only by the arborist for invoicing

134. Which activity is prohibited inside a properly enforced Tree Protection Zone?

A. Vehicle traffic and material storage

B. Visual monitoring by the project arborist

C. Supervised hand excavation of small volumes

D. Maintenance of protective mulch cover

135. A tree with no visible decline one year after construction:

A. Has fully recovered and needs no monitoring

B. Should still be monitored for delayed decline

C. Is immune to any future structural failure

D. Can be aggressively fertilized without concern

136. When utility work must cross a protected root zone, the arborist should:

A. Allow the excavator to proceed without supervision

B. Direct workers to tear out roots for speed

C. Refuse to participate in any planning discussion

D. Supervise clean root pruning in advance of digging

137. In formal tree risk assessment, "risk" is defined as the combination of:

A. Likelihood of failure and severity of consequences

B. Tree age and total trunk diameter

C. Species and geographic location

D. Property value and insurance coverage

138. A Level 2 tree risk assessment typically involves:

A. Only a drive-by visual from a moving vehicle

B. A laboratory analysis of collected wood cores

C. A detailed visual inspection of an individual tree

D. Theoretical modeling based on species alone

139. A Level 1 tree risk assessment is typically:

A. A laboratory confirmation of decay extent

B. A detailed structural load test of the trunk

C. An advanced sonic tomography scan

D. A rapid limited visual screening

140. Codominant stems with included bark are hazardous because:

A. They conduct water more slowly than single stems

B. Bark between the stems prevents a strong union

C. They always contain internal wood decay

D. They produce more leaves than a single leader

141. A fungal fruiting body at the base of a trunk indicates:

A. Healthy mycorrhizal activity in the root zone

B. Normal seasonal shedding of outer bark

C. Active decay already within the tree

D. Excessive nitrogen levels in the soil

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

A. Anything of value that could be struck by tree failure

B. A specific branch identified for removal during pruning

C. A tree identified for complete removal

D. An area marked for soil amendment application

143. Target occupancy rate describes:

A. The total value of nearby real estate parcels

B. The number of trees per square acre of land

C. The age of the nearest man-made structures

D. How often a target is present in the strike zone

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

A. Normal phototropic growth toward brighter sunlight

B. Root plate movement and imminent uprooting risk

C. Minor cosmetic damage from recent windy weather

D. Seasonal soil movement unrelated to any tree issue

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

A. The exact species of a tree from the sound

B. The total nitrogen content of the trunk tissue

C. Hollow areas and decay columns through sound change

D. Overwintering insect larvae inside the bark

146. The TRAQ risk matrix combines which two dimensions?

A. Likelihood of failure and impact with consequences

B. Tree species and trunk diameter together

C. Site drainage and measured soil pH

D. Property value and measured tree age

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

A. Failure is considered unlikely during the period

B. Failure is likely to occur during the assessment period

C. Failure is already occurring or imminent

D. Failure cannot happen under any possible condition

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

A. Minor property damage only, no injury

B. No measurable impact on any target

C. Moderate damage with small personal injury

D. Catastrophic damage, serious injury, or death

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

A. The cavity drains water quickly after rain

B. The cavity is smaller than four inches wide

C. Sufficient intact wood remains around the perimeter

D. The cavity is above six feet of ground level

150. Consequences of failure depend on:

A. Part size, fall height, and nature of the target

B. Only the total weight of the failing part

C. Only the distance between tree and structure

D. Only the age of the tree at the time

151. Residual risk refers to:

A. The monetary cost of insurance claims

B. Risk of injury while performing mitigation

C. Risks observable only after tree removal

D. Risk remaining after mitigation measures

152. A professional tree risk assessment report should include:

A. Only a single sentence risk rating

B. The arborist's billing information only

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

D. A removal recommendation for every tree

153. Level 3 risk assessment tools include:

A. Basic mallet sounding of the trunk

B. Resistograph drilling and sonic tomography

C. A standard tape measure only

D. Visual inspection from ground level

154. Cabling and bracing systems installed on mature trees:

A. Reduce but do not eliminate structural risk

B. Completely eliminate all risk of failure

C. Are required for every mature tree by standard

D. Never need any inspection after installation

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

A. Use the most technical jargon available

B. Recommend only the most expensive option

C. Withhold uncertain information from the owner

D. Present options in plain language with respect for the client

156. Root defects are difficult to assess during risk evaluation because:

A. They always heal spontaneously over time

B. They are heavily regulated under federal law

C. Roots are below ground and not directly visible

D. Root defects occur only in young trees

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

A. Healthy callus around a small old wound

B. Codominant stems with included bark

C. An active vertical trunk crack

D. A large dead scaffold limb over a house

158. Appropriate mitigation for a moderate-risk branch over a house might include:

A. Removing the entire tree preemptively

B. Reduction pruning to decrease end weight

C. Ignoring the branch until it eventually fails

D. Cabling every branch in the entire crown

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

A. ANSI Z60.1 covering nursery stock

B. ANSI A300 covering pruning practices

C. OSHA 29 CFR 1910.67 covering lifts

D. ANSI Z133 covering arboricultural safety

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

A. Three feet in every direction

B. Five feet in every direction

C. Ten feet in every direction

D. Twenty-five feet in every direction

161. A qualified line-clearance arborist is distinguished from an unqualified worker by:

A. Experience in general landscape design work

B. Specialized training in electrical hazards

C. Having purchased insulated work gloves

D. Being licensed to operate a bucket truck

162. A climbing helmet used in arboricultural work must include:

A. A chin strap to retain the helmet during climbing

B. A detachable face shield for welding tasks

C. An open face design for peripheral vision

D. Reflective tape on every exterior surface

163. Chainsaw-resistant leg protection works by:

A. Activating a magnetic brake inside the clutch

B. Sounding an audible warning to the operator

C. Reflecting the moving chain away from skin

D. Containing fibers that clog the chain on contact

164. Hearing protection is required when noise levels exceed:

A. Forty-five decibels of exposure

B. Sixty-five decibels of exposure

C. Eighty-five decibels of exposure

D. One hundred twenty decibels of exposure

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

A. Only the names of the crew members present

B. Work, hazards, PPE, and emergency response

C. Only the expected total project cost

D. Only the specific pruning objectives for the day

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

A. Only when climbing trees over one hundred feet tall

B. Only when working on weekends or holidays

C. For every climbing operation with a crew

D. Only when electrical hazards are present

167. Suspension trauma can develop when a climber:

A. Ascends a rope too quickly on a stationary line

B. Climbs with an overly tight harness fit

C. Uses an outdated style of chest ascender

D. Remains motionless in a harness for an extended time

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

A. The upper portion of the bar tip

B. The middle of the cutting bar length

C. The rear of the bar near the engine

D. Behind the operator's right hand grip

169. The chainsaw chain brake is designed to:

A. Slow the chain to a cutting idle speed

B. Stop the chain when activated by kickback motion

C. Prevent engine flooding during startup

D. Reduce vibration transmitted to the hands

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

A. Only fingertip contact for quick release

B. Palm contact with the thumb alongside the handle

C. The thumb wrapped fully around the front handle

D. A loose grip to absorb the engine vibration

171. Two-handed operation of a chainsaw is:

A. Required only for felling very large trees

B. Optional based on the operator's preference

C. Reserved for cutting above the operator's head

D. The standard grip for nearly all saw operation

172. Top-handle chainsaws are designed specifically for:

A. Bucking large logs while on the ground

B. Climbing arborist use up in the canopy

C. Operation by entry-level ground workers

D. Felling full-size mature trees in forestry

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

A. Catch the chain if it breaks during cutting

B. Secure the chain to the bar during transport

C. Sharpen the chain automatically during use

D. Lubricate the chain during long operations

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

A. One-half of the rated tensile strength

B. Nine-tenths of the rated tensile strength

C. One-tenth of the rated tensile strength

D. Equal to the rated tensile strength

175. Shock loading in rigging refers to:

A. Electrical charge building in a dry rope

B. Initial lifting force applied to a cut piece

C. Static weight of the largest piece handled

D. Dynamic forces from a suddenly caught falling piece

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

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

B. Use a friction device allowing controlled slip

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

D. Position the ground worker beneath the cut piece

177. A block that redirects a rigging load experiences approximately:

A. Twice the force of the load itself

B. Half the force of the load itself

C. Exactly the force of the load itself

D. No additional force when installed properly

178. The hinge in a standard felling cut:

A. Must be completely severed before the tree falls

B. Is needed only for hollow or decayed trees

C. Is formed by the first cut of the notch

D. Controls fall direction as the tree goes over

179. An escape route during felling operations should:

A. Lead directly beneath the falling tree

B. Be improvised at the moment of the fall

C. Be planned and cleared before cutting begins

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. Vertical splitting of the trunk during the back cut

C. A decorative feature deliberately left in the stump

D. A chainsaw technique used for hollow trees

181. Chipper operators should feed branches into the machine:

A. With the butt end first while standing to the side

B. Tip first while standing directly behind the infeed

C. Only during daylight hours while wearing gloves

D. With loose clothing to allow quick escape

182. Aerial lift operators must maintain minimum approach distances:

A. Only at the bucket itself, not the boom

B. Only when the boom is fully extended

C. Only with the vehicle engine turned off

D. With both the bucket and the entire boom structure

183. Personal protective equipment must be inspected:

A. Only during annual company safety reviews

B. Only after a known impact or failure event

C. Before every use, with damaged items retired

D. Only when the manufacturer recommends inspection

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

A. One thousand eight hundred pounds

B. Five thousand four hundred pounds

C. Twelve thousand pounds

D. Twenty-five thousand pounds

185. A properly tied friction hitch must:

A. Grip reliably under load while allowing controlled adjustment

B. Lock rigidly and never move under any applied load

C. Be replaced after every single use of the system

D. Be tied with barbed wire for maximum friction

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

A. Meter the lubricant to the cutting rollers

B. Indicate the speed of the chipping drum

C. Switch the chipper between forward and reverse

D. Stop the feed rollers in an emergency

187. When refueling a chainsaw, the operator should:

A. Keep the saw running at low idle

B. Stop the saw and allow it to cool briefly

C. Refuel quickly without removing the cap

D. Refuel with cut-resistant gloves still on

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 officer

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

A. Shading surfaces and evapotranspiration cooling

B. Absorbing heat from soils through their roots

C. Releasing methane gas into the atmosphere

D. Reflecting sunlight from waxy leaf surfaces

190. A complete tree inventory records information on:

A. Only trees scheduled for immediate removal

B. Only trees with obvious structural defects

C. A statistical sample of the total population

D. Every tree within the defined inventory area

191. The i-Tree suite of analytical tools was developed by:

A. The Environmental Protection Agency

B. The USDA Forest Service

C. The National Arbor Day Foundation

D. The International Society of Arboriculture

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

A. A tree is too large to replace with nursery stock

B. A tree has been killed by a specific known pest

C. Only a small shrub is being evaluated for value

D. The tree has no monetary value at all

193. A typical tree protection ordinance:

A. Bans all pruning by private property owners

B. Requires immediate removal of invasive species

C. Prohibits planting of any non-native species

D. Requires permits for removal of protected trees

194. Canopy cover goals are typically expressed as:

A. Total leaf biomass in tons per acre annually

B. Percentage of land area covered by canopy

C. Number of trees per square mile of city

D. Average tree height in feet across the city

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

A. Two dollars per capita annually

B. Ten dollars per capita annually

C. Fifty dollars per capita annually

D. One hundred dollars per capita annually

196. Species rating in plant appraisal reflects:

A. The lumber value of the harvested wood

B. The tree's current total height in feet

C. Desirability and suitability in the local area

D. The exact age of the tree in calendar years

197. Communication with a property owner about recommended tree work should use:

A. Highly technical scientific vocabulary for credibility

B. Plain language with respect for the owner's decisions

C. Pressure tactics to close the sale quickly

D. Refusal to provide any pricing estimate details

198. A documented social benefit of urban tree canopy is:

A. Increased crime rates in leafy neighborhoods

B. Reduced property values near large mature trees

C. Higher rates of asthma across all age groups

D. Improved mental health outcomes for residents

199. An urban forester making the case for canopy expansion should emphasize:

A. Documented dollar value of ecosystem services

B. The personal aesthetic preferences of staff

C. The cost savings of removing mature trees

D. The simplicity of installing artificial turf instead

200. Street trees planted in a diverse mix following the 10-20-30 rule:

A. Must include only native species from the region

B. Must be purchased from a single approved nursery

C. Protect the community against catastrophic pest loss

D. Should be limited to very slow-growing species only

PRACTICE EXAM 3 — ANSWER KEY AND EXPLANATIONS

1. D — Xylem conducts water and dissolved minerals upward from roots to leaves but does not transport sugars. Downward sugar transport from leaves is the function of phloem. The two vascular tissues handle opposite directions and different materials.

2. A — Immediately inside the vascular cambium lies the sapwood (functional xylem), the most recently produced wood that actively conducts water. The cambium produces new xylem inward and new phloem outward each year. This arrangement is fundamental to understanding woody stem anatomy.

3. C — Trees store surplus photosynthate primarily as starch held in living parenchyma cells within sapwood, inner bark, and roots. Starch reserves fluctuate seasonally and fuel recovery from defoliation, drought, and spring bud break. This is why repeated defoliation is so damaging.

4. B — Chlorophyll in leaf chloroplasts is the primary light-capturing pigment, absorbing red and blue wavelengths while reflecting green. Carotenoids and xanthophylls are accessory pigments that become visible only when chlorophyll breaks down in fall. Chlorophyll is the engine of photosynthesis.

5. A — Less than ten percent of a mature tree's volume consists of living cells. The vast majority is dead structural wood (heartwood and inner sapwood) and dead protective bark. The thin living layer includes the cambium, inner bark phloem, and sapwood parenchyma.

6. D — Wall 4 is formed by the cambium around a wound and resists the outward spread of decay into new wood produced after the injury. It is the strongest of the four CODIT walls and the reason cuts must preserve the branch collar, which contains the cambium that forms Wall 4.

7. C — Phloem conducting elements are sieve tube members accompanied by companion cells that support their metabolic functions. Unlike xylem, phloem cells remain alive at maturity because sugar transport requires active cellular processes. Tracheids and vessel members are xylem structures.

8. B — Carbon enters the tree from the atmosphere as carbon dioxide and is incorporated into sugars through photosynthesis. Every gram of wood ultimately comes from atmospheric carbon. All other listed nutrients come from the soil.

9. D — The rhytidome is the outer bark composed of dead corky cells that protects the living tissues beneath from mechanical damage, desiccation, and pathogens. It is continuously shed and renewed as the trunk expands. The cambium, sapwood, and phloem are all living tissues inside it.

10. A — Turgor pressure is maintained by water held within the central vacuole of living plant cells, pushing outward against the cell wall. Loss of turgor causes wilting when water supply fails to meet transpiration demand. This is the physical mechanism behind visible drought symptoms.

11. C — A mast year is a year of unusually heavy fruit or seed production, often synchronized across a tree population of the same species. Mast years are a reproductive strategy that overwhelms seed predators and improves successful germination. Oak acorn crops are a classic example.

12. B — Respiration consumes oxygen to release energy stored in carbohydrates, powering cell division, ion uptake, and defense. Every living cell respires continuously, day and night. This is why stressed trees continue to deplete reserves even when photosynthesis has stopped.

13. D — Phloem flows from source to sink, meaning from tissues producing sugars (usually leaves) to tissues consuming or storing them (roots, fruits, growing tips, storage parenchyma). Flow direction can change seasonally. This "source-to-sink" model is more accurate than a simple "down-only" description.

14. A — Transpiration is the evaporation of water from leaf surfaces, primarily through stomata, which generates the tension that pulls more water upward through xylem conduits. This drives the cohesion-tension mechanism and requires no metabolic energy. It is the engine of water movement in trees.

15. B — A single annual ring in a temperate tree consists of lighter-colored earlywood (fast spring growth, larger cells) and darker latewood (slower summer growth, denser cells) produced during one growing season. The contrast between earlywood and latewood creates the visible ring pattern.

16. C — Apical dominance is maintained by auxin hormones produced at the shoot tip, which travel downward and suppress the growth of lateral buds below. This is why removing the terminal bud of a young tree releases lateral buds to grow. The phenomenon is central to structural pruning in juvenile trees.

17. A — Auxin is the plant hormone responsible for apical dominance. It is produced at the growing shoot tip and transported downward, suppressing lateral bud development below. When the tip is removed, auxin flow stops and lateral buds are released.

18. D — Most absorbing roots are found in the upper eighteen inches of soil, where oxygen, water, and nutrients are most available. They extend well beyond the dripline, often two to three times the crown radius. The deep taproot image is largely incorrect for mature trees in most soils.

19. B — Adventitious roots are roots that arise from stems or other non-root tissues, rather than from the seed radicle or existing root systems. They can develop from buried trunks or from mulch piled against bark, and they contribute to the girdling root problems seen in deeply planted trees.

20. C — Deciduous leaf drop conserves water and protects the tree from freezing damage, because broad thin leaves cannot be maintained through winter when liquid water is unavailable. The tree recovers nutrients from leaves before drop. This is a survival adaptation, not a weight-reduction strategy.

21. A — Most conifer needles are evergreen and persist for several years — typically two to seven depending on species — before being shed and replaced. This allows year-round photosynthesis when conditions allow. Larch and bald cypress are unusual deciduous exceptions.

22. D — Epicormic shoots arise from dormant buds beneath older bark, often in response to sudden light exposure, heavy pruning, or tree stress. They are structurally weaker than normal branches because they originate from shallow bud traces. Topping trees typically stimulates heavy epicormic sprouting.

23. B — *Quercus* is the genus containing all oaks, which bear acorns (single nuts in scaly cups). Oaks are divided into the white oak group and red oak group based on leaf and acorn characteristics. The genus is central to temperate forest ecology.

24. C — Fagaceae is the beech family, which includes both oaks (*Quercus*) and beeches (*Fagus*), as well as chestnuts. Members share similar pest susceptibilities and wood characteristics. Family-level recognition matters in diagnosis and management.

25. D — *Acer* (maples) has opposite leaf arrangement and produces paired winged samaras that spin as they fall. This combination of features is diagnostic for the genus. Oaks, pines, and elms all have different combinations of leaf arrangement and fruit type.

26. A — Conifers including pines, spruces, firs, hemlocks, and cedars have needle-like or scale-like leaves rather than broad flat leaves. This distinction is the first major cut in tree identification. Most broadleaf trees (angiosperms) have flat leaves.

27. C — Scientific names use the binomial system: genus capitalized, specific epithet lowercase, both italicized in print (or underlined in handwriting). *Acer rubrum* follows these conventions correctly. Other variations violate the typographic rules.

28. B — Cultivar names are written in single quotation marks and are not italicized, following the International Code of Nomenclature for Cultivated Plants. An example is *Acer rubrum* 'October Glory'. Cultivars are selected forms propagated to maintain specific traits.

29. A — Bald cypress (*Taxodium distichum*) is a deciduous conifer that sheds its needles each autumn. Larch (*Larix*) and dawn redwood (*Metasequoia*) are other deciduous conifers. Most conifers, including pines, spruces, and junipers, are evergreen.

30. D — Longleaf pine (*Pinus palustris*) has needles that average about twelve inches in length, the longest of any commonly encountered North American pine. Eastern white pine has much shorter five-inch needles. Needle length is a useful pine identification feature.

31. B — American sycamore (*Platanus occidentalis*) is distinguished by mottled exfoliating bark that reveals tan, gray, and cream patches, combined with broad palmate leaves. The bark alone often allows identification from a distance. Hickories, oaks, and maples have very different bark patterns.

32. C — Norway maple (*Acer platanoides*) is widely considered invasive across much of the eastern United States. It escapes into forests and shades out native understory species. The other listed species are all natives with important ecological value.

33. A — Red oaks have pointed leaf lobe tips ending in bristles, and their acorns mature over two growing seasons. White oaks have rounded lobes without bristles, and their acorns mature in a single season. These differences are the primary distinction between the two groups.

34. D — Maple fruit is technically classified as a samara — a dry fruit with a papery wing attached to a single seed. Maples produce paired samaras (double samaras). The wing design aids wind dispersal.

35. C — A palmately compound leaf has leaflets radiating from a single attachment point at the tip of the petiole, like fingers of a hand. Horse chestnut and buckeye are classic examples. Pinnately compound leaves, by contrast, have leaflets along a central rachis.

36. B — Maples, ashes, and dogwoods all have opposite leaf arrangement (along with horse chestnut, completing the MAD Horse mnemonic). Oaks, hickories, walnuts, birches, cherries, and beeches are all alternate. Opposite arrangement is relatively uncommon.

37. D — Right Tree, Right Place is the principle of 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 because young nursery specimens look very different from fully grown trees.

38. C — *Quercus* is the oak genus, and oaks produce acorns (single nuts partially enclosed in a scaly cup). This is one of the most distinctive fruit types in temperate trees. *Acer*, *Fagus*, and *Ulmus* all produce different fruit types.

39. B — 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. This hierarchy protects against both species-specific and broader taxonomic threats. Dutch elm disease and emerald ash borer show why the rule matters.

40. A — A tree planted beneath a 25-foot distribution line must have a mature height safely below the conductors. This is a direct application of Right Tree, Right Place. Planting a species that will grow into the wires guarantees future utility pruning conflicts.

41. D — Soil texture is defined by the proportions of sand, silt, and clay in the mineral fraction, listed in descending particle size. These three size classes behave differently and produce very different soil properties. Texture is permanent and cannot be meaningfully altered.

42. B — Loam is a soil containing roughly balanced proportions of sand, silt, and clay — typically about 40% sand, 40% silt, and 20% clay. It drains adequately, holds water, and supports good structure. Loam is the ideal texture for most tree species.

43. C — Soil pH is measured on a logarithmic scale from 0 to 14, with 7 being neutral, values below 7 acidic, and values above 7 alkaline. Each whole number represents a tenfold change in hydrogen ion concentration. Most trees grow best in a slightly acidic range.

44. A — Most tree species grow best at a pH between 6.0 and 7.0 — slightly acidic to neutral. This range provides optimal availability of the widest variety of essential nutrients. Acid-loving and alkaline-tolerant species are exceptions to this general rule.

45. D — 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.

46. B — Compacted soil has reduced pore space and fewer large pores to hold air, so roots are starved of the oxygen needed for respiration. Roots that cannot respire cannot absorb water or nutrients. This is the primary mechanism by which compaction kills urban trees.

47. C — An ideal soil is roughly 50% pore space by volume, split between water and air, and 50% solids (45% mineral plus 5% organic matter). The pore space is where roots, water, and air reside. Loss of pore space through compaction is one of the most common urban soil problems.

48. A — A proper mulch layer is 2 to 4 inches deep with the trunk base kept clear of mulch. Deeper layers can suffocate roots and encourage rodent damage, and piling mulch against the trunk causes bark decay. The correct shape is a flat ring, not a volcano.

49. D — Bulk density above approximately 1.7 g/cm³ indicates severe compaction that halts most root growth. Values below 1.3 generally indicate uncompacted soil. Bulk density quantifies compaction that visual inspection can only estimate.

50. B — Mycorrhizal fungi colonize tree roots and extend hyphae into the surrounding soil, dramatically increasing the effective absorbing surface area of the root system. The tree supplies sugars; the fungus supplies access to water and nutrients from a larger soil volume. The partnership is essential, not optional.

51. C — Nitrogen is most commonly available to plant roots in the forms of nitrate (NO_3^-) and ammonium (NH_4^+) ions dissolved in soil water. Elemental nitrogen gas is not directly usable by most plants. Soil microbes convert organic nitrogen into these plant-available ionic forms.

52. A — A soil test sample for an individual tree should be a composite of multiple subsamples collected from throughout the root zone and combined into a single sample. A single spot sample is not representative. Proper sampling is the most important step in soil testing.

53. D — A perc test measures how quickly water drains from a test hole, providing a simple field assessment of drainage. Water that persists for more than 12 to 24 hours indicates a drainage problem. The test should be performed before planting water-sensitive species.

54. B — Texture cannot be meaningfully altered by any realistic amount of amendment because the sand, silt, and clay proportions are determined by parent material and weathering history. Structure, organic matter, and biological activity can all be improved; texture cannot. This is why working with existing texture is the only realistic strategy.

55. C — Planting holes should be at least two to three times the diameter of the root ball. This provides a zone of loosened soil for new roots to expand into during establishment. Width matters more than depth for root development.

56. 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.

57. D — Current best practice is to backfill with 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. B — Wire baskets and twine on B&B root balls are removed from the upper portion to prevent future girdling of the trunk as it expands. Twine around the trunk is particularly dangerous because it does not decompose and can strangle the growing stem. This is a routine but essential planting step.

59. C — 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 and leads to bark decay, girdling roots, and long-term decline. The correct depth is non-negotiable.

60. A — Establishment of a newly planted tree typically requires approximately one year 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 the root system.

61. D — Staking is appropriate only when necessary and should be removed within one growing season in most cases. Unnecessary or prolonged staking produces weaker trunks and can cause girdling wounds. The natural flex of the trunk builds strength and taper.

62. C — Planting too deep buries the root flare and causes gradual decline as bark decay, girdling root development, and oxygen starvation progress below ground. The tree may appear normal for a year or two before symptoms become visible. This is one of the most common causes of preventable early tree death.

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

64. A — 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. Standard practice is to withhold fertilizer until the tree is established.

65. D — A B&B 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 for B&B stock.

66. C — 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.

67. B — Advance root pruning severs roots at the future root ball line one to two 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. It is the single most effective technique for improving transplant success.

68. A — Planting too deep — burying the root flare — is the most common serious planting error and the leading cause of early decline. The buried flare develops bark decay and girdling root problems. Finding and preserving the true root flare is essential.

69. D — Mulching conserves soil moisture, moderates soil temperature, suppresses weed competition, and protects the trunk from mower damage. These combined benefits make mulching the single most valuable post-planting practice. Nitrogen supply and insect protection are not primary mulch functions.

70. C — Nursery stock should be inspected at delivery for trunk condition (straight, no wounds), crown structure (single leader, good spacing), visible root flare, and root ball condition (firm, moist, intact). Defects identified before acceptance can be avoided by rejecting the tree. Price and container brand are irrelevant to quality.

71. 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.

72. C — ANSI Z60.1 is the American Standard for Nursery Stock, specifying minimum standards for root ball size, trunk caliper, crown form, and other quality characteristics. It is the principal reference for nursery stock quality in the United States. Arborists involved in inspection or procurement should be familiar with it.

73. D — ANSI A300 is the American National Standard for Tree Care Operations, covering pruning, cabling, fertilization, and other maintenance practices. It is the principal reference for professional pruning practice in the United States. ANSI Z133 addresses safety requirements.

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

75. C — Topping is a harmful and unacceptable pruning practice that violates every principle of proper pruning simultaneously. It creates large wounds that cannot close, removes excessive foliage, depletes reserves, and produces weakly attached epicormic sprouts. ANSI A300 explicitly prohibits it.

76. B — 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 in the three-cut method is made on the underside of the branch, partway through, several inches beyond the final cut location. This undercut prevents bark tearing when the overcut releases the branch. The sequence is non-negotiable for any branch heavy enough to tear bark.

78. D — Cleaning is one of the five primary pruning objectives recognized in ANSI A300 (clean, thin, raise, reduce, restore). It refers to selective removal of dead, dying, diseased, broken, and weakly attached branches. Topping, stripping, and lion-tailing are not recognized objectives.

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

80. B — A reduction cut removes a branch back to a lateral branch large enough (typically at least one-third the diameter of the removed portion) to assume the terminal role. The retained lateral continues the branch's growth and function. Heading cuts, by contrast, leave arbitrary stubs.

81. A — Structural pruning during the juvenile phase produces the greatest benefit because small cuts 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.

82. C — 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. Mature trees cannot be pruned like young ones.

83. B — Topping a mature shade tree is explicitly prohibited by ANSI A300 because it creates large wounds, depletes reserves, triggers weakly attached sprouts, and destroys natural architecture. No legitimate pruning objective requires topping. Cleaning, reducing, and raising are all acceptable practices.

84. D — Bypass pruners use two curved blades passing each other in a scissor-like action, producing clean cuts on living wood without crushing tissue. Anvil pruners use a single blade striking a flat surface and are reserved for dead material. Clean cuts support proper compartmentalization.

85. A — 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 itself. Both flush cuts and stub cuts cause lasting damage.

86. C — 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 into the trunk. The damage cannot be undone.

87. D — Lion-tailing strips interior foliage and leaves foliage only at the branch tips, concentrating weight at the branch ends. This creates weaker branches than properly distributed thinning and is explicitly discouraged under current standards. The pattern removes interior foliage that cushions wind loads.

88. B — Pollarding requires repeated pruning back to 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. This is a traditional specialty technique, not a routine pruning method.

89. A — Restoration pruning is applied to trees that have been topped, vandalized, or severely storm-damaged. The goal is to develop a reasonable crown structure from the adventitious sprouts that have emerged after damage. It is a long-term process requiring multiple visits over years.

90. C — Research has shown that wound dressings provide minimal benefit to wound healing 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, with narrow exceptions such as oak wilt regions.

91. D — 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. This is the one specific exception where wound dressings on oaks during warm months are also justified. Timing is the primary defense.

92. B — 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 along with the collar.

93. A — Bypass hand pruners are appropriate for branches up to approximately three-quarters of an inch in diameter. They produce clean cuts on living wood with minimal effort. Larger branches require loppers, hand saws, or power equipment.

94. C — 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. Branches smaller than about three-quarters of an inch are better handled by hand pruners. Tool selection should match branch diameter.

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

96. A — Stripping is not a recognized pruning objective under ANSI A300. The five primary objectives are clean, thin, raise, reduce, and restore. Stripping is a harmful practice that removes foliage indiscriminately without regard to tree biology.

97. B — Codominant stems with included bark should be corrected early, while the tree is young and the needed cuts are small. Waiting until maturity requires much larger and more damaging cuts, and the stems may split catastrophically before correction is ever attempted. Early structural pruning is the best response.

98. C — Pruning tools should be sharpened regularly, often at the start of each workday or whenever cutting performance degrades. Dull blades produce ragged wounds and require excessive force. Sharp tools are safer and produce cleaner cuts that heal faster.

99. D — 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.

100. B — 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 and applies to trees of all ages.

101. C — 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 without establishing species leads to routine misdiagnosis. Species identification is the first step in every diagnostic framework.

102. A — 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. Diagnosis based on signs is far more defensible.

103. D — 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 different problems can produce overlapping symptoms, which is why signs are more reliable.

104. B — A primary pest can attack and kill healthy, vigorous trees without requiring the host to be stressed first. Secondary pests, by contrast, attack only weakened trees. The distinction is critical for management — primary pests may require preventive treatment, while secondary pests require addressing underlying stress.

105. A — Emerald ash borer is classified as a primary pest because it can successfully attack 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. Management often requires preventive treatment.

106. C — 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 controls are warranted.

107. B — Fire blight is caused by the bacterium *Erwinia amylovora* and affects members of the rose family (Rosaceae). It produces blackened shepherd's-crook-shaped branches that appear scorched. Sanitation pruning well below visible infection is the standard management.

108. D — 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 particularly risky in affected regions. Red oak group species are more susceptible than white oaks.

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

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

111. D — Cupped and distorted new leaves are a classic sign of damage from phenoxy herbicides such as 2,4-D, which mimic plant growth hormones. The distortion is often most severe on the side of the tree nearest the application source. This symptom pattern is diagnostic when paired with application history.

112. C — Delayed decline years after construction activity typically results from root damage suffered during the work. Trees mobilize reserves to mask initial injury, and symptoms appear one to several years later when reserves are exhausted. The connection to the original event is often forgotten by the time decline appears.

113. B — 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. A — 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. Above-ground symptoms include general decline and thinning crown.

115. D — 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. It remains a threat to surviving elms.

116. B — Trunk injection of systemic insecticides is most appropriate for high-value trees threatened by borers, where foliar sprays would be impractical for mature specimens. Injection provides rapid systemic translocation with low environmental exposure. The tradeoff is that each injection wounds the tree.

117. C — "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. This applies to every licensed applicator.

118. A — Maximum use of chemicals regardless of thresholds contradicts the core principles of IPM. IPM uses chemicals only when justified by threshold analysis and prefers the least toxic effective option. Monitoring, thresholds, and multiple control tactics are all genuine components.

119. D — 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 and many municipal ordinances.

120. B — Tree protection fencing should be installed at the CRZ boundary or further from the trunk, not at the dripline or closer. Placing fencing closer than the CRZ leaves significant root area exposed to damage. The fencing enforces the biological protection zone.

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

122. A — 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. The delayed damage is often blamed on unrelated causes.

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 available. Higher equipment cost typically favors boring when tree value is significant.

124. B — Storage of construction materials within a TPZ is explicitly prohibited because stockpiles compact the underlying soil under their weight and smother roots. This is one of the standard prohibitions enforced by TPZ fencing. Monitoring and approved supervised work are compatible with protection.

125. C — Pre-construction tree assessment should occur before final design decisions are locked in, so findings can influence the design to accommodate preservation. Assessment performed after drawings are complete is reduced to documentation of what has already been decided. Timing matters as much as thoroughness.

126. D — Deliberate root pruning in advance of unavoidable excavation should be performed with sharp tools to make clean cuts. Clean cuts produce better wound responses than the tearing and crushing that result from unprepared excavation. Prepared cuts dramatically improve outcomes.

127. A — Post-construction care should emphasize deep periodic watering, generous mulching, and multi-year monitoring. Heavy fertilization and aggressive crown reduction can worsen decline in stressed trees. Patience and supportive care drive successful 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 to damage. The CRZ formula produces a more conservative and defensible boundary.

129. C — Delayed decline following construction damage typically becomes visible months to several years after the triggering event. Trees mobilize reserves to mask initial injury, and when reserves are exhausted, decline begins. Post-construction 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. Effective fencing is the operational enforcement of the written protection plan.

131. D — 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. Physical fencing makes exclusion enforceable.

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 across the root zone can remove a large share of absorbing roots. Effects appear sooner than with grade raises.

133. C — 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. Baseline documentation is a legal as well as technical necessity.

134. A — Vehicle traffic and material storage within a TPZ are prohibited because they cause compaction and root damage. These are two of the standard prohibitions enforced by TPZ fencing. Monitoring, approved supervised work, and mulch application are compatible with protection.

135. B — A tree showing no visible decline one year after construction should still be monitored for delayed decline, because symptoms can appear one to three years later as reserves are exhausted. Monitoring should continue for at least three to five growing seasons. Early apparent survival is not the same as long-term recovery.

136. D — When utility work must cross a protected root zone, the supervising arborist should direct clean root pruning in advance of digging. Clean cuts produce better wound responses than unprepared excavation. This is the standard professional response to unavoidable impacts.

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 to produce a meaningful risk rating.

138. C — A Level 2 assessment is a detailed visual inspection of an individual tree, typically performed while walking around it and inspecting from multiple angles using basic tools such as a mallet and probe. It is the standard level for trees of concern. Level 1 is rapid screening; Level 3 uses advanced instrumentation.

139. D — Level 1 assessment is a rapid limited visual screening used for large tree populations along streets, through parks, or across properties. Its purpose is to identify obvious hazards requiring further evaluation, not to produce detailed analysis. Individual trees of concern warrant Level 2 or 3.

140. B — Codominant stems with included bark are hazardous because the trapped bark prevents the formation of a strong structural union. The attachment becomes progressively weaker as the stems grow, and catastrophic splitting can occur without warning. This is one of the most dangerous structural defects.

141. C — A fungal fruiting body at the base of a trunk indicates active decay already established within the tree. Fruiting bodies are the reproductive stage of fungi whose vegetative bodies extend into the tree's tissues. They warrant closer evaluation but do not automatically mandate removal.

142. A — A target in tree risk assessment is any person, property, or activity that could be affected by a failing tree or tree part. Without targets, even high likelihood of failure does not produce high risk. Targets and failure likelihood must combine to produce risk.

143. D — Target occupancy rate formalizes how often a target is present within the potential strike zone. Higher occupancy contributes to higher overall risk because failures are more likely to coincide with target presence. A house is constant; a seldom-used trail is rare.

144. B — 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. C — 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. It is imprecise but rapid and inexpensive.

146. A — The TRAQ risk matrix combines likelihood of failure and impact (probability that a failure will occur and strike a target) with consequences of failure (severity if impact occurs). The combination produces the overall risk rating. Neither factor alone is sufficient.

147. B — A probable likelihood of failure in TRAQ means failure is likely to occur during the assessment time frame under normal conditions. This is distinct from possible (could occur but not likely) and imminent (failure in progress). The four levels are improbable, possible, probable, and imminent.

148. D — 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. Matching ratings to potential outcomes drives the risk rating to appropriate levels.

149. C — A tree with an internal cavity may still be structurally sound if sufficient intact wood remains around the perimeter to resist bending forces. A commonly cited guideline holds that at least one-third of the diameter should remain as sound wood. Cavity size alone does not mandate removal.

150. A — Consequences of failure depend on the size and mass of the failing 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. Context determines the outcome.

151. D — Residual risk is the risk that remains after mitigation measures have been implemented. No mitigation eliminates risk entirely — pruned trees can still fail, cabled unions can still split. Clients must understand they are choosing acceptable risk levels, not zero risk.

152. C — A professional risk assessment report should document the scope of the assessment, identified defects, targets, recommended mitigation, and explicit residual risk. Thorough reporting supports defensibility and client decision-making. A single-sentence conclusion does not constitute a professional report.

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. Mallet sounding and visual inspection are Level 2 techniques.

154. A — Cabling and bracing provide supplemental support that reduces but does not eliminate structural risk. The installations require ongoing inspection and maintenance, and residual risk

always remains. They are appropriate when defects cannot be addressed by pruning alone and when tree value justifies the cost.

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

156. C — Root defects are difficult to assess because roots are below ground and cannot be directly observed. Arborists must rely on indirect indicators such as root plate movement, fungal fruiting bodies at the flare, and construction history. Air excavation can expose the root flare when necessary.

157. A — Healthy callus tissue around a small old wound indicates successful compartmentalization — the tree has walled off the injury and closed the wound. This is evidence of normal healing, not a structural defect. The other options are genuine defects requiring attention.

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. Immediate removal is not proportional to moderate risk.

159. D — ANSI Z133 is the American National Standard for Arboricultural Operations — Safety Requirements. It is the principal safety standard for tree care work in the United States and defines the accepted professional standard of care. ANSI A300 addresses maintenance practices, not safety.

160. C — 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 encountered in residential and commercial tree work. Unqualified workers may not cross it.

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

162. A — 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. Climbing helmets are purpose-built for aerial work.

163. D — 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 is not perfect but dramatically reduces injury severity from inadvertent contact.

164. C — 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. Many veteran tree workers develop preventable hearing damage.

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

166. C — ANSI Z133 requires aerial rescue capability on every climbing operation with a crew — at least one worker other than the climber must be trained and equipped to perform a rescue. This is not optional and does not depend on tree height or weather. Outside emergency services alone are inadequate.

167. D — 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 and the circulatory system to become compromised. It can become life-threatening within 30 minutes. This makes aerial rescue time-critical.

168. A — 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, either when activated manually by the front handguard or automatically in response to kickback motion. It is an essential safety feature that must be functional on every saw in service. A saw with a nonfunctional chain brake must be removed from service.

170. C — The left hand should grip the front handle with the thumb wrapped fully around the underside of the handle, not positioned alongside it. This grip is stronger and provides better control if the saw moves unexpectedly. It is the standard grip for all chainsaw operation.

171. D — Two-handed operation is the standard grip for nearly all chainsaw operation, ground-based or otherwise, and is required except in specific climbing situations using top-handle saws. The standard grip provides maximum control and reduces injury risk from unexpected saw movement.

172. B — Top-handle chainsaws are designed specifically for climbing arborist use, where compact size and potential one-handed operation in the canopy are required. They should not be used for ground-based work or by untrained operators. Specific training on top-handle saws is required.

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

174. C — 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 cumulative wear.

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

176. B — 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. Every significant rigging operation should include a friction device.

177. A — A block redirecting a rigging load over an anchor experiences approximately twice the force of the load itself, because the block holds both the lifting side and holding side of the rope simultaneously. A 1,000-pound piece produces about 2,000 pounds of force on the block anchor. 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. C — 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. Workers who remain at the stump are in the most dangerous position.

180. B — 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, killing workers in the fall zone. Leaning hardwoods are particularly prone.

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

182. D — Aerial lift operators must maintain minimum approach distances with both the bucket and the entire boom structure, because the metal boom is an excellent conductor and can carry electricity from a contacted line throughout the machine. The whole lift is a potential conductor.

183. C — 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 for life-safety equipment.

184. B — 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. Lower-strength ropes are not compatible with the standard.

185. A — 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. Hitches must be inspected before each climb.

186. D — 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 of the worker feeding the machine. This is a critical safety feature on modern chippers.

187. B — 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 in tree work. Storage off-site is inadequate.

189. A — 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. The cooling effect lowers air conditioning demand.

190. D — 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. Complete inventories provide the richest basis for management decisions.

191. B — The i-Tree suite was developed by the USDA Forest Service to help communities estimate the dollar value of ecosystem services provided by their tree populations. The tools transform tree management into documented infrastructure investment and are widely used in budget justifications.

192. A — 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. Smaller trees are appraised using the replacement cost method.

193. D — A typical tree protection ordinance requires permits for removal of protected trees, usually defined by size or species threshold. Penalties apply for unauthorized removal. The specific provisions vary between jurisdictions but the permit requirement is the central feature.

194. B — Canopy cover goals are typically expressed as a 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. Communities often set specific numerical targets.

195. A — 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. These requirements are the standard criteria.

196. C — Species rating in plant appraisal reflects the desirability, suitability, and performance 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. Regional ISA chapters publish species rating lists.

197. B — 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 owns the tree and makes the final decision with the arborist's guidance.

198. D — Multiple studies have found improved mental health outcomes for residents of neighborhoods with more trees, along with reduced stress, faster recovery from illness, and increased physical activity. These social benefits complement the environmental and economic benefits. The human-health case is increasingly central to advocacy.

199. A — A budget-focused audience 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. The i-Tree tools provide exactly the quantitative data such audiences require.

200. C — 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. The rule does not require natives, single nurseries, or slow-growing species.