

PRACTICE EXAM 12: ISA CERTIFIED ARBORIST SIMULATION

PRACTICE EXAM 12 — QUESTIONS 1–200

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

1. In the sequence of secondary growth in a tree trunk, new wood cells are produced first by which tissue?
 - A. Heartwood expanding outward each season
 - B. Outer bark splitting and regenerating annually
 - C. The vascular cambium dividing inward toward the center
 - D. The pith producing new xylem tissue each year

2. Which CODIT wall is formed first by the tree in response to a fresh wound?
 - A. Wall 1, plugging vertical xylem vessels
 - B. Wall 4, forming at the wound margin cambium
 - C. Wall 2, resisting inward decay spread
 - D. Wall 3, resisting lateral decay spread

3. In the pathway of water through a tree, which tissue does soil water enter first?
 - A. The vascular cambium of the trunk
 - B. The phloem of the inner bark
 - C. The heartwood cylinder at the center

D. The root epidermis and root hairs

4. When a tree experiences sudden drought stress, the first protective response is:

A. Production of new reaction wood in the trunk

B. Closure of stomata to conserve water

C. Translocation of stored sugars to the leaves

D. Formation of a new layer of bark

5. The primary form in which trees first store surplus photosynthate for later use is:

A. Starch held in living parenchyma cells

B. Lignin deposited in secondary cell walls

C. Sucrose dissolved in xylem vessels

D. Cellulose locked in fiber cell walls

6. Which structure must function first for upward water transport in a tree to occur?

A. Root cortex pumping cells

B. Phloem sieve tube elements

C. Leaf stomata generating evaporative tension

D. Apical meristems at the shoot tips

7. The first major demand on a tree's carbohydrate reserves each spring is:

A. Production of new bark on the trunk

B. Refoliation and bud break throughout the canopy

- C. Thickening of the heartwood core
- D. Replacement of dead phloem cells

8. Carbohydrate reserves in temperate trees reach their lowest annual level in which season?

- A. Midsummer at peak photosynthesis
- B. Early autumn before leaf drop
- C. Midwinter during deepest dormancy
- D. Late spring after new leaves have emerged

9. When making a pruning cut, the first anatomical structure that must be preserved to allow proper wound response is:

- A. The branch collar containing the cambium
- B. The pith cylinder of the removed branch
- C. The heartwood beneath the cambium
- D. The outer bark layer on the parent stem

10. In the tree's vascular system, which tissue is primarily responsible for moving water upward?

- A. The cambium between bark and wood
- B. The phloem of the inner bark
- C. The xylem forming the sapwood
- D. The pith at the center of the stem

11. Which tissue is primarily responsible for moving sugars from leaves to roots?

- A. Xylem in the outer sapwood layer
- B. Heartwood at the trunk center
- C. Cambium between wood and bark
- D. Phloem in the inner bark

12. Apical dominance in a young tree is initially established by which hormonal signal?

- A. Cytokinin produced by active root tips
- B. Auxin produced at the shoot tip
- C. Ethylene released from ripening fruits
- D. Abscisic acid from the vascular cambium

13. Which layer of a mature trunk contains the most metabolically active cells?

- A. The vascular cambium between xylem and phloem
- B. The heartwood at the very center
- C. The outer rhytidome of the bark
- D. The pith cylinder at the stem center

14. Mycorrhizal fungi benefit a host tree primarily by which mechanism?

- A. Fixing atmospheric nitrogen within root tissues
- B. Producing antibiotics that kill soil pathogens
- C. Decomposing dead organic matter rapidly
- D. Extending hyphae to expand absorbing surface area

15. In a mature tree, the greatest concentration of absorbing roots is typically found at what depth?

- A. Below five feet in the deeper subsoil
- B. In the central taproot zone only
- C. In the upper 12 to 18 inches of soil
- D. Along the face of the lower heartwood

16. When stomata close during heat stress, the most immediate consequence is reduction of:

- A. Only respiration in the roots
- B. Both transpiration and photosynthesis together
- C. Only phloem transport of sugars
- D. Only heartwood production in the trunk

17. Which of the following is correctly described as a dead tissue at functional maturity?

- A. Xylem conducting cells in the sapwood
- B. Phloem sieve tube elements in the bark
- C. Cambium cells between wood and bark
- D. Root hair cells at the absorbing surface

18. A tree responding to persistent wind flexing develops which adaptation first?

- A. Thinner, more flexible bark layers
- B. Smaller leaves to reduce wind loading
- C. Deeper central taproots for anchoring
- D. Greater trunk taper and reaction wood

19. The cohesion-tension theory of water movement in trees depends primarily on:

- A. Active metabolic pumping by root cortex cells
- B. Atmospheric pressure pushing water from below
- C. Hydrogen bonding holding water columns under tension
- D. Osmotic gradients within the leaf mesophyll

20. Heartwood differs from sapwood primarily because heartwood:

- A. Produces new phloem each growing season
- B. Consists of dead cells with deposited extractives
- C. Conducts the majority of water upward
- D. Is the most metabolically active trunk tissue

21. When a tree is girdled, decline typically progresses in which sequence?

- A. Root starvation first, then canopy dieback later
- B. Canopy dieback first, then root death later
- C. Simultaneous collapse of all tissues at once
- D. Only bark damage without any internal effect

22. The first and most important function of leaf stomata during daylight is:

- A. Anchoring the leaf blade firmly to the petiole
- B. Storing carbohydrate reserves overnight
- C. Regulating gas exchange between leaf and atmosphere
- D. Producing chlorophyll for photosynthesis

23. The first step in identifying an unknown deciduous tree is typically to examine:

- A. Root flare characteristics below the surface
- B. The exact height of the tree in feet
- C. The dollar value of the surrounding landscape
- D. Leaf arrangement, shape, and venation

24. Which feature is most reliable as a FIRST identification clue for distinguishing maples from oaks?

- A. The color of the tree's fall foliage
- B. Leaf arrangement, opposite versus alternate
- C. The total mature height of the species
- D. The age of the tree at first flowering

25. In written scientific nomenclature, the genus name is always placed first and should be:

- A. Written entirely in lowercase without italics
- B. Written in bold capitals for emphasis
- C. Capitalized and italicized in printed text
- D. Enclosed in single quotation marks

26. The MAD Horse mnemonic helps identify trees with which specific feature?

- A. Opposite leaf arrangement on the stems
- B. Palmately compound leaves with many leaflets
- C. Deciduous needles that drop each fall
- D. Distinctive peeling bark on mature trunks

27. When selecting a tree for a planting site, the first consideration under Right Tree, Right Place is:

- A. The price of the nursery stock available
- B. Matching mature size and characteristics to the site
- C. The leaf color the homeowner prefers
- D. The time of year the tree will be planted

28. White oaks are distinguished from red oaks first by which feature?

- A. The color of the outer trunk bark
- B. The height of the mature tree at maturity
- C. Whether they grow in eastern or western forests
- D. Rounded leaf lobes without bristle tips

29. A tree appropriate for planting beneath a 30-foot distribution line should have which characteristic first?

- A. Mature height safely under 25 feet at maturity
- B. Evergreen foliage in all four seasons
- C. Compound leaves with multiple leaflets
- D. Dense surface roots near the trunk

30. When a plant is labeled with a name in single quotation marks following the species, this designation identifies a:

- A. Botanical variety from a wild population
- B. Subspecies recognized in formal codes
- C. Cultivar selected and propagated for specific traits

D. Common name used by local nurseries

31. The 10-20-30 rule of urban forest diversity limits the maximum percentage of plantings at which three taxonomic levels?

A. Cultivar, variety, and subspecies level

B. Species, genus, and family of the planting

C. Order, class, and division of plants

D. Native only, invasive only, and ornamental

32. Tree of heaven (*Ailanthus altissima*) should be identified and classified first as:

A. A native forest understory species

B. A short-lived nursery ornamental

C. A federally endangered species

D. A non-native invasive species

33. Which of the following conifers would be identified first by its habit of shedding all its needles each autumn?

A. Bald cypress in the genus *Taxodium*

B. Eastern white pine in the genus *Pinus*

C. Eastern hemlock in the genus *Tsuga*

D. Eastern red cedar in *Juniperus*

34. A tree with opposite leaves, palmately compound foliage, and upright spring flower spikes would be identified first as:

- A. White ash in the olive family
- B. Black walnut in the walnut family
- C. Horse chestnut in the soapberry family
- D. Eastern redbud in the legume family

35. The first family-level identification for the ash genus *Fraxinus* places it in which plant family?

- A. Pinaceae, the pine family
- B. Fagaceae, the beech family
- C. Rosaceae, the rose family
- D. Oleaceae, the olive family

36. The first group to consider for trees with alternate leaf arrangement in eastern forests is:

- A. Maple, ash, and dogwood together
- B. Oak, hickory, and beech together
- C. Horse chestnut, buckeye, and viburnum
- D. Catalpa, paulownia, and dogwood

37. The first feature used to identify American sycamore from a distance is typically:

- A. Mottled tan and gray peeling bark
- B. Compact dense needle foliage
- C. Paired winged samaras in spring

D. Small clusters of red berries

38. When selecting a native species over a non-native, the primary advantage to consider first is:

A. Automatic pest immunity across all species

B. Always faster growth than introduced plants

C. Co-adaptation to local climate and ecology

D. Guaranteed lower mature height

39. A pinnately compound leaf is identified first by its arrangement of leaflets:

A. Radiating from a single attachment point

B. Arranged along two sides of a central rachis

C. Borne directly on the woody stem

D. Joined together as one continuous blade

40. In winter identification, the first features an arborist should examine on a leafless tree are:

A. New spring foliage color and venation

B. Flower fragrance from the previous year

C. Root flare width measured at soil level

D. Bud shape, twig features, and bark character

41. The first step before planting a tree at a new site should be to evaluate which soil characteristic?

A. The exact dollar value of surrounding real estate

B. Soil texture, drainage, and basic pH

- C. The age of nearby existing buildings
- D. The direction of prevailing summer winds

42. On the soil pH scale, the first threshold that separates acidic from alkaline conditions is:

- A. A value of 7.0, the neutral midpoint
- B. A value of 5.0, the acidic threshold
- C. A value of 10.0, the alkaline threshold
- D. A value of 14.0, the scale endpoint

43. The first characteristic used to classify a soil as loam, clay, or sand is:

- A. The annual rainfall at the site
- B. The temperature of the soil through the year
- C. The color of the surface layer
- D. The relative proportions of sand, silt, and clay

44. Before recommending a soil amendment, the first diagnostic test an arborist should order is:

- A. A detailed drone canopy survey of the lot
- B. A water quality analysis of the nearest stream
- C. A composite soil sample sent to a testing lab
- D. An aerial infrared photograph of the root zone

45. When installing mulch around a landscape tree, the first rule to observe is:

- A. Pile mulch high against the trunk for support

- B. Keep mulch 2 to 4 inches deep with the trunk clear
- C. Replace all mulch with plastic sheeting each year
- D. Apply mulch only during the dormant season

46. When compaction is identified in a root zone, the first remedial priority is typically to:

- A. Apply a heavy dose of nitrogen fertilizer
- B. Till the soil deeply with a rototiller
- C. Spray the surface with a wetting agent
- D. Restore pore space through techniques like air excavation

47. The first factor that determines a soil's cation exchange capacity (CEC) is:

- A. The clay content and organic matter present
- B. The annual rainfall received at the site
- C. The daily soil temperature through the year
- D. The depth of the surface topsoil horizon

48. An ideal mineral soil for tree growth has approximately what percentage of pore space?

- A. About 10 percent of the total volume
- B. About 25 percent of the total volume
- C. About 50 percent of the total volume
- D. About 90 percent of the total volume

49. The first diagnostic step when a pin oak in alkaline soil shows yellow leaves with green veins is to:

- A. Apply nitrogen fertilizer immediately to the root zone
- B. Remove the tree and replace with another species
- C. Spray foliar insecticide across the canopy
- D. Test soil pH and consider iron availability

50. Before planting any tree on a new site, the first drainage test typically performed is:

- A. A conductivity test of the local groundwater
- B. A perc test to measure water drainage rate
- C. A bacterial culture of the surface soil
- D. A chemical assay for pesticide residues

51. The first practical action for improving long-term soil organic matter in a landscape is to:

- A. Maintain a continuous organic mulch layer
- B. Till the soil deeply each spring season
- C. Apply fine builder's sand annually
- D. Spray hydrogen peroxide on the surface

52. In poorly drained soils, the first site modification an arborist may recommend is:

- A. A heavy single application of lime
- B. Daily foliar nutrient sprays during growth
- C. Raised planting beds or surface grading for drainage
- D. A solid layer of geotextile fabric over the surface

53. The first characteristic that makes a soil essentially permanent and unchangeable is:

- A. The depth of its root zone
- B. Its organic matter content over time
- C. Its bulk density measurement
- D. The proportions of sand, silt, and clay

54. A bulk density reading of 1.8 g/cm^3 in mineral soil identifies the first priority as:

- A. Adding more nitrogen to encourage growth
- B. Relieving severe compaction halting root growth
- C. Reducing irrigation to dry out the soil
- D. Raising soil pH with lime applications

55. The first step before digging a planting hole for a new tree is to:

- A. Locate and identify the true root flare
- B. Apply fertilizer to the surrounding lawn
- C. Prune back the crown by one-third
- D. Install stakes around the planned hole

56. When placing a tree in its planting hole, the root flare should first be positioned:

- A. Six inches below the surrounding grade
- B. Twelve inches below the lawn surface
- C. At or slightly above the surrounding grade
- D. Completely buried beneath several inches of mulch

57. The correct backfill material for a planting hole is generally:

- A. Sterilized purchased potting mix only
- B. The native soil excavated from the hole
- C. Equal parts peat moss and perlite mixed
- D. Coarse builder's sand with added lime

58. The first rule for planting hole width is to dig the hole to:

- A. Exactly the diameter of the root ball
- B. Half the diameter of the root ball
- C. Ten times the diameter of the root ball
- D. Two to three times the root ball diameter

59. A newly planted tree should first be staked only when:

- A. The site is too windy for the tree to stand alone
- B. The homeowner prefers a more formal appearance
- C. The crew has extra stakes left over from other jobs
- D. The tree is more than 20 feet tall at planting

60. When a circling root is discovered inside a container at planting, the first action is to:

- A. Coat it with rooting hormone and plant immediately
- B. Leave it intact to avoid damaging fine tips
- C. Cut or straighten it before placing in the hole
- D. Apply a commercial wound dressing to seal it

61. The first action to take with a wire basket and burlap on a B&B tree after placement in the hole is to:

- A. Leave them intact to support the root ball permanently
- B. Remove the basket entirely before setting the tree
- C. Replace the basket with plastic mesh immediately
- D. Cut and remove at least the upper portion of both

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

- A. Watering too lightly during the first week
- B. Setting the root ball too deep with a buried flare
- C. Using the wrong brand of fertilizer tablets
- D. Failing to install decorative edging around the tree

63. The first watering priority after planting a new tree is to:

- A. Keep the root ball consistently moist but not saturated
- B. Keep the root ball completely dry for deep rooting
- C. Flood the hole every day for the first week
- D. Water only on the south side of the trunk

64. Fertilization during the first growing season after planting is generally:

- A. The most important practice for transplant survival
- B. Required by most municipal planting specifications
- C. Unnecessary and sometimes counterproductive
- D. Best applied as a foliar spray to new leaves

65. The first preferred window for transplanting most deciduous trees is:

- A. Mid-summer during peak active growth
- B. Immediately after leaf expansion in spring
- C. Any month with adequate irrigation available
- D. Dormancy in late fall or early spring

66. Before transplanting a mature tree, the first preparatory step one or more seasons in advance is:

- A. Advance root pruning along the future root ball line
- B. Heavy nitrogen fertilization of the current root zone
- C. Complete removal of all lower branches
- D. Trunk wrapping with protective foam padding

67. After setting a B&B tree in its hole, the first twine-related action should be to:

- A. Leave all twine in place because it decomposes quickly
- B. Remove completely all twine tied around the trunk
- C. Tighten the existing twine for additional stability
- D. Replace the twine with heavier rope before backfilling

68. A B&B tree should always first be lifted by:

- A. Grasping the trunk firmly with two gloved hands
- B. Wrapping the crown with lifting straps
- C. Pulling on the burlap from the top of the ball
- D. Supporting the root ball from underneath

69. Which of the following is NOT one of the first benefits delivered by proper mulching of a newly planted tree?

- A. Conserving moisture in the root zone
- B. Moderating soil temperatures over time
- C. Supplying all the tree's nitrogen needs each year
- D. Suppressing weeds competing with the new tree

70. The first rule governing planting hole depth is that the hole must:

- A. Equal the height from root flare to ball bottom
- B. Be at least twice the height of the root ball
- C. Reach below the tree's lowest scaffold branches
- D. Include a layer of gravel for drainage below

71. When a newly delivered nursery tree arrives on site, the first inspection action should cover:

- A. The brand name printed on the nursery container
- B. Trunk, crown, root flare, and root ball condition
- C. The exact weight printed on the delivery manifest
- D. The width of the wire basket holding the ball

72. A newly planted tree that fails to leaf out in spring most likely failed first because of:

- A. A foliar disease affecting the expanding buds
- B. Inadequate mulch depth at the trunk base
- C. Cold temperatures during normal dormancy

D. Root ball desiccation during handling before planting

73. The first American standard an arborist should reference for pruning and maintenance practices is:

- A. ANSI Z133 covering arboricultural safety only
- B. ANSI Z60.1 covering nursery stock specifications
- C. ANSI A300 covering tree pruning practices
- D. ANSI Z89.1 covering head protection equipment

74. The first principle of correct pruning cut placement is to cut:

- A. Just outside the branch collar and bark ridge
- B. Flush with the parent stem for a smooth surface
- C. At the exact midpoint of the branch length
- D. Six inches beyond the branch collar and ridge

75. Topping a mature shade tree should be rejected first because it:

- A. Requires specialty equipment most crews lack
- B. Creates large wounds, depletes reserves, and produces weak sprouts
- C. Cannot be performed without damaging utility lines
- D. Is permitted only under narrow safety exemptions

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

- A. From above at the exact final cut location
- B. Straight down through the top of the branch

- C. Parallel to the trunk to score the bark surface
- D. On the underside of the branch beyond the final cut

77. The cleaning pruning objective begins first with selective removal of:

- A. All interior live foliage to thin the crown
- B. Every lateral branch crossing another branch
- C. Dead, dying, diseased, broken, or weak branches
- D. The outermost six inches of every branch tip

78. The first distinguishing feature of a reduction cut compared to a heading cut is that a reduction cut:

- A. Cuts back to a lateral large enough to assume the role
- B. Is always made with hand pruners only
- C. Removes only branches under one inch in diameter
- D. Leaves an arbitrary stub regardless of laterals

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

- A. Trees in their final decade of mature life
- B. Young trees during the juvenile growth phase
- C. Mature trees with established canopies
- D. Recently planted trees during establishment

80. In one pruning session, the first limit on live foliage removal from a mature tree is approximately:

- A. 25 to 30 percent during active growth

- B. 40 to 50 percent in the dormant season
- C. 10 to 15 percent, less for stressed specimens
- D. There is no upper limit for healthy mature trees

81. The branch bark ridge, which marks the first reference point for cut placement, is best described as:

- A. A raised line of bark on the upper side of a branch union
- B. An internal decay barrier inside the heartwood
- C. The outer corky layer covering the trunk surface
- D. A layer of dead bark within the sapwood zone

82. Lion-tailing damages trees first by:

- A. Removing only deadwood from the canopy
- B. Causing excessive bleeding from the cut surfaces
- C. Stripping interior foliage and concentrating weight at branch ends
- D. Cutting through the central leader at the trunk

83. Pollarding requires the arborist to first commit to:

- A. Annual wound dressing applications
- B. Repeated cuts at the same framework points on a schedule
- C. A complete removal of the central leader
- D. A permanent ban on any future growth

84. Restoration pruning is first applied to trees that have been:

- A. Recently planted during normal establishment
- B. Selected for removal at project completion
- C. Designated as historic specimens by ordinance
- D. Topped, vandalized, or severely storm damaged

85. Current research on wound dressings shows they first:

- A. Provide minimal benefit and sometimes slow healing
- B. Eliminate any risk of decay organism entry
- C. Accelerate compartmentalization across all species
- D. Meet an ANSI A300 requirement for all cuts

86. In oak wilt regions, the first scheduling priority for oak pruning is to:

- A. Work during warm summer months to speed wound closure
- B. Work only on wet rainy days when beetles are inactive
- C. Postpone all oak pruning until dormancy
- D. Prune at any time of year using sterilized tools

87. Subordination pruning is first used to:

- A. Eliminate the central leader entirely from the tree
- B. Remove all epicormic sprouts from the trunk
- C. Cut every lateral branch to equal lengths
- D. Reduce the growth of a competing stem in favor of a leader

88. A flush cut is harmful first because it:

- A. Produces excessive force on the cutting tool
- B. Removes the branch collar and Wall 4 tissue
- C. Leaves a projecting stub beyond the collar
- D. Allows excess rainwater to enter the wound

89. A stub cut damages the tree first because it:

- A. Cannot be compartmentalized and invites decay
- B. Stores reserves for future epicormic sprouts
- C. Adds useful structural weight to the branch
- D. Helps birds nest more securely on the trunk

90. For cutting living wood up to one inch in diameter, the first tool choice should be:

- A. Anvil loppers that crush the wood fibers
- B. A top-handle chainsaw for efficiency
- C. Bypass hand pruners with clean blades
- D. A pole pruner with a hook attachment

91. A pole pruner is most appropriate first for:

- A. Branches over six inches in diameter overhead
- B. Felling small trees on flat terrain
- C. Cutting all lower branches on mature trees
- D. Small branches out of reach without climbing

92. When a client requests 50 percent live foliage removal, the arborist's first response should be to:

- A. Agree and charge double for the additional work
- B. Explain that such removal violates accepted standards
- C. Comply using only bypass hand pruners
- D. Remove only the smallest interior branches first

93. Codominant stems with included bark should first be corrected when:

- A. Stems are still small and cuts remain minor
- B. The tree has reached full structural maturity
- C. A systemic fungicide is available to spray
- D. The owner has requested tree removal

94. The raise pruning objective first addresses which problem?

- A. Excessive height of the entire crown above the trunk
- B. Weak attachment at every scaffold branch union
- C. Inadequate vertical clearance beneath the canopy
- D. Unwanted fruit production on fruiting branches

95. Tool disinfection between cuts is the first priority when:

- A. Working on healthy trees during dormant season
- B. Pruning trees affected by contagious diseases
- C. Using hand pruners on small twigs only
- D. Performing routine pruning of any healthy tree

96. Which of the following should NOT be first included in a professional pruning specification?

- A. The identified pruning objective for the work
- B. The percentage of live foliage to be removed
- C. The diameter range of cuts to be made
- D. The climber's personal stylistic preferences

97. Bypass loppers are first appropriate for branches up to approximately:

- A. One and a half to two inches in diameter
- B. Four to six inches in diameter
- C. Eight inches in diameter or larger
- D. Less than one-quarter inch in diameter

98. Removing a dead branch from a mature tree is first classified under which pruning objective?

- A. Reducing to lower the crown height
- B. Raising to provide pedestrian clearance
- C. Cleaning to remove dead and weak branches
- D. Restoring after previous storm damage

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

- A. The brand of cutting tool used by the climber
- B. The weather conditions during the operation
- C. The time of day when the cut is made
- D. The placement of the cut relative to the branch collar

100. The first precaution before beginning any pruning job on a client's tree is to:

- A. Apply broad-spectrum fungicide to the canopy
- B. Establish the intended pruning objective clearly
- C. Sharpen all tools at the worksite immediately
- D. Stake the tree to prevent it from moving

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

- A. Identify the species and its normal characteristics
- B. Apply broad-spectrum fungicide as a precaution
- C. Recommend immediate removal of the tree
- D. Collect tissue samples for laboratory analysis

102. When investigating signs versus symptoms, the arborist should first look for:

- A. A homeowner's complaint about leaf appearance
- B. The tree's general response such as wilting
- C. A description written in the inspection report
- D. Direct evidence of the causal agent itself

103. The first characteristic that defines a "symptom" in tree disease diagnosis is that it represents:

- A. A visible fruiting body of a fungal pathogen
- B. Laboratory confirmation of a specific pathogen
- C. The tree's response such as yellowing or wilting
- D. Direct evidence of the causal agent itself

104. A primary tree pest is first identified by its ability to:

- A. Reproduce only under drought stress conditions
- B. Kill healthy vigorous trees on its own
- C. Be found only in remote forested areas
- D. Attack only trees already weakened by stress

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

- A. Successfully attacks healthy ash trees of all sizes
- B. Was introduced earlier than other wood borers
- C. Reproduces only under drought stress conditions
- D. Requires bark wounds to enter the host tree

106. Integrated Pest Management is best described first as:

- A. A specific brand of organic pesticide formulation
- B. A complete prohibition on all chemical control
- C. A method limited only to biological control agents
- D. A decision framework using monitoring, thresholds, and tactics

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

- A. Pinaceae including pines and firs
- B. Rosaceae including apples and pears
- C. Sapindaceae including maples
- D. Fagaceae including oaks and beeches

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

- A. Wind dispersing spores across forests
- B. Soil nematodes feeding on fine roots
- C. Root grafts and sap-feeding beetles at wounds
- D. Rain splashing from infected leaves

109. The first clue that interveinal chlorosis on new leaves of a pin oak in alkaline soil may reflect is:

- A. Iron deficiency related to high soil pH
- B. Nitrogen deficiency from lawn competition
- C. Excess rainfall causing root rot damage
- D. Calcium toxicity from previous over-liming

110. Yellowing that first begins on older inner leaves and progresses outward typically indicates deficiency of which mobile nutrient?

- A. Iron, an immobile micronutrient
- B. Calcium, a structural secondary nutrient
- C. Boron, a trace element for cell division
- D. Nitrogen, a mobile macronutrient

111. The first diagnostic interpretation for cupping and twisting of new growth on a mature tree is:

- A. An active spider mite outbreak in the canopy
- B. Phenoxy herbicide drift or residual exposure
- C. Normal seasonal fall color development

D. Drought stress during a dry period

112. The first likely cause of delayed decline appearing three years after nearby construction is:

- A. A new invasive insect pest in the region
- B. Normal aging unrelated to the construction
- C. Root damage during construction exhausting reserves
- D. Reduced rainfall during the dormant period

113. Anthracnose is first classified as which type of disease?

- A. A fungal disease producing leaf spots and blotches
- B. A bacterial infection of the vascular system
- C. A viral disease transmitted by aphid vectors
- D. A nutrient disorder limited to new growth

114. Armillaria root rot is first confirmed in the field by finding:

- A. Orange pustules on the upper surface of leaves
- B. Sticky honeydew dripping from twig tips
- C. Hollow tunnels carved into the heartwood
- D. White mycelial sheets beneath infected bark

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

- A. Soil nematodes feeding on elm root systems
- B. Elm bark beetles and root grafts between trees

- C. Wind blowing spores across long distances
- D. Rain splash from infected foliage

116. For a high-value tree threatened by borers, the first appropriate treatment consideration is often:

- A. Weekly foliar sprays throughout the season
- B. Soil drench with an herbicide product
- C. Trunk injection of a systemic insecticide
- D. No treatment because the tree cannot be saved

117. Before any pesticide application, the first legal requirement for the applicator is to:

- A. Call the local extension office for approval
- B. Notify all nearby neighbors in advance
- C. Wait for cool temperatures below 60 degrees
- D. Read and follow the product label exactly

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

- A. Communicate honestly and recommend appropriate management
- B. Apply experimental treatments without informing the owner
- C. Recommend removing all nearby trees as a precaution
- D. Refuse to discuss the finding with the property owner

119. The first step before starting any construction project near a mature tree is to:

- A. Remove the tree to prevent any future conflict

- B. Calculate and mark the Critical Root Zone clearly
- C. Apply a heavy nitrogen fertilizer to the root zone
- D. Prune the crown heavily to balance root losses

120. The Critical Root Zone (CRZ) of a mature tree is first calculated using a radius of:

- A. Six inches per inch of trunk diameter
- B. Three feet per inch of trunk diameter
- C. One foot per inch of trunk diameter at breast height
- D. Two feet per inch of trunk diameter at breast height

121. The first boundary for tree protection fencing on a construction site should be:

- A. The trunk itself, encircling the bark closely
- B. The dripline regardless of tree size or species
- C. Half the distance between trunk and dripline
- D. The CRZ boundary or further from the trunk

122. The first concern with concrete washout occurring inside a Tree Protection Zone is that:

- A. The high pH of the washwater can sterilize soil
- B. The aggregate physically damages absorbing roots
- C. The vibration disturbs fine root hairs
- D. The cement sets up around root surfaces

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

- A. Immediate tree death within a few days
- B. Gradual decline as roots lose oxygen access
- C. Stronger anchorage during major storms
- D. Improved drainage benefits across the root zone

124. The first preference for installing a utility line across a mature tree's root zone is:

- A. Open-cut trenching at full depth through the CRZ
- B. Surface installation directly on the soil
- C. Directional boring beneath the root zone
- D. Mechanical auger boring downward from above

125. The first rule governing construction material storage inside a Tree Protection Zone is that it is:

- A. Permitted if the materials are lightweight
- B. Required to free up other staging areas
- C. Allowed only during dry weather conditions
- D. Prohibited because of compaction and root damage

126. A pre-construction tree assessment should first occur:

- A. Before final design so findings influence decisions
- B. After demolition has begun on the site
- C. After foundations have been poured and graded
- D. Only if trees later show obvious symptoms

127. When excavation must unavoidably cross roots, the arborist's first field action should be to:

- A. Allow the excavator to tear roots freely
- B. Apply wound sealant before the cut is made
- C. Make clean cuts with sharp tools at the damage line
- D. Wait until after excavation to assess damage

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

- A. Aggressive crown reduction to balance root losses
- B. Deep watering, mulching, and multi-year monitoring
- C. Heavy nitrogen fertilization to force new growth
- D. Immediate trunk injection with systemic fungicide

129. The first objection to using the dripline alone as a tree protection boundary is that:

- A. Drip patterns change shape during different seasons
- B. Drip lines cannot be enforced legally
- C. Drip lines are too difficult to survey accurately
- D. Actual root systems extend well beyond the dripline

130. Delayed decline following construction damage typically first becomes visible:

- A. Months to several years after the triggering event
- B. Within hours of the damaging activity ending
- C. Only during the next major drought cycle
- D. Always on the first anniversary of the construction

131. Tree protection fencing on a construction site should first be:

- A. Lightweight flagging tape crews can move freely
- B. Short stakes spaced widely apart for appearance
- C. Sturdy, visible, clearly marked, and maintained throughout
- D. Painted to match nearby buildings on the lot

132. The first and most effective action for protecting a mature tree during construction is to:

- A. Wrap the trunk in protective foam padding
- B. Exclude all activity from the root zone entirely
- C. Pre-fertilize heavily before work begins
- D. Reduce the crown to balance expected root losses

133. Lowering the grade around an established tree first causes:

- A. Direct loss of functional roots with the removed soil
- B. Improved drainage benefits to deeper roots
- C. Increased nutrient access in newly exposed layers
- D. Better wind anchorage from remaining roots

134. A baseline tree condition report prepared before construction first serves to:

- A. Eliminate any need for later monitoring work
- B. Be used exclusively for billing the client
- C. Satisfy all regulatory requirements automatically
- D. Document pre-existing conditions for later comparison

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

- A. Assumed fully recovered and ignored from then on
- B. Fertilized heavily to force vigorous new growth
- C. Monitored for delayed decline for additional seasons
- D. Removed as a precaution against future failure

136. Hand or air excavation within a Tree Protection Zone should first be used when:

- A. Conventional trenching would be cheaper for the contractor
- B. Roots must be identified and preserved during work
- C. Speed is the most important consideration on site
- D. The soil is too dry for mechanical equipment

137. In formal tree risk assessment, the first component of "risk" is:

- A. The likelihood of failure combined with consequences
- B. The total monetary value of the tree at market
- C. The age of the tree multiplied by its height
- D. The presence of any visible defect on the trunk

138. A Level 2 tree risk assessment is first characterized as:

- A. A laboratory analysis of collected wood cores
- B. A rapid drive-by screening of street trees
- C. A theoretical model based on species alone
- D. A detailed visual inspection of an individual tree

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

- A. Detailed evaluation of a single specimen of concern
- B. Rapid screening of large tree populations
- C. Advanced internal diagnostics with instruments
- D. Post-incident investigation of failure events

140. Codominant stems with included bark are hazardous first because:

- A. They emit chemical signals attracting decay organisms
- B. They act as reservoirs for boring insect larvae
- C. The trapped bark prevents formation of a strong union
- D. They alter the tree's center of gravity over time

141. The first interpretation of a fungal fruiting body on a trunk is that:

- A. Active decay is already established within the tree
- B. A healthy mycorrhizal partnership is present
- C. The bark is undergoing normal seasonal shedding
- D. Excess nitrogen from fertilization has accumulated

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

- A. A specific branch identified for pruning removal
- B. A zone where the tree is expected to fall
- C. An area of decay that has become externally visible
- D. Any person, property, or activity that could be affected

143. Target occupancy rate is first used in risk assessment to describe:

- A. The number of trees per acre in a given area
- B. The frequency and duration of target presence in the strike zone
- C. The age of structures beneath the canopy
- D. The total value of nearby real estate

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

- A. Normal phototropic adjustment toward sunlight
- B. A cosmetic change without structural meaning
- C. Root plate movement and elevated uprooting risk
- D. Seasonal soil movement unrelated to the tree

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

- A. Detecting hollow areas through changes in sound
- B. Measuring nitrogen content of the trunk wood
- C. Identifying the species from the sound alone
- D. Locating overwintering insects in the bark

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

- A. Tree species and trunk diameter at breast height
- B. Site drainage and measured soil pH
- C. Property value and the tree's age in years

D. Likelihood of failure and impact with consequences

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

- A. Failure has already occurred or is imminent
- B. Failure is unlikely but still possible
- C. Failure is likely to occur during the assessment period
- D. Failure cannot occur under any foreseeable conditions

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

- A. Minor property damage easily repaired at low cost
- B. Catastrophic damage, serious injury, or death
- C. Moderate damage with no significant injury
- D. No measurable effect on any nearby targets

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

- A. Sufficient intact wood remains around the cavity perimeter
- B. The cavity drains rainwater quickly after storms
- C. The cavity is smaller than four inches in width
- D. The cavity is located above six feet from grade

150. Consequences of failure first depend on which combination of factors?

- A. Only the total weight of the falling tree part
- B. Only the distance between tree and nearest structure

- C. Only the calendar age of the tree at failure
- D. The size of the part, fall height, and nature of the target

151. Residual risk is first defined as:

- A. The cost of insurance premiums on a property
- B. Risk remaining after mitigation has been implemented
- C. Risk during the mitigation work itself
- D. Risk visible only after a tree is removed

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

- A. The scope of the assessment performed
- B. Identified defects and nearby targets
- C. A removal recommendation for every tree examined
- D. Recommended mitigation and residual risk

153. Level 3 risk assessment tools first include which advanced techniques?

- A. Standard measuring tape and ground observation
- B. Color photographs taken from a moving vehicle
- C. Basic hand pruners and a small rubber mallet
- D. Resistograph drilling and sonic tomography

154. Cabling and bracing systems first function to:

- A. Reduce but not eliminate structural risk

- B. Eliminate all structural risk on the union completely
- C. Satisfy an ANSI A300 requirement for all mature trees
- D. Replace the need for any further inspection

155. Effective communication of risk findings to a property owner first requires:

- A. Highly technical jargon to establish credibility
- B. Plain language and respect for the owner's decisions
- C. A recommendation of only the most expensive option
- D. Withholding of uncertain information to avoid worry

156. Root defects are difficult to evaluate first because roots:

- A. Always heal spontaneously on their own
- B. Are only found in young trees recently planted
- C. Are below ground and not directly observable
- D. Never produce any above-ground symptoms

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

- A. A healthy rounded callus around an old small wound
- B. A codominant stem with significant included bark
- C. An active vertical crack exposing internal wood
- D. A large dead scaffold limb above an occupied area

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

- A. Removing the entire tree as a preventive measure
- B. Ignoring the situation until the branch actually fails
- C. Cabling every branch in the entire crown
- D. Reduction pruning to decrease end weight on the limb

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

- A. ANSI A300 covering pruning practices
- B. ANSI Z60.1 covering nursery stock
- C. ANSI Z133 covering arboricultural safety
- D. OSHA 29 CFR 1926 for general construction

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

- A. Three feet in any direction
- B. Ten feet in any direction
- C. Twenty-five feet in any direction
- D. Five feet in any direction

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

- A. General experience in landscape design work
- B. A current license to operate a bucket truck
- C. Personal ownership of insulated rubber gloves
- D. Specialized training in electrical hazards and line clearance

162. A climbing helmet must first include which feature beyond a standard hard hat?

- A. A wide brim blocking direct sunlight
- B. A chin strap to retain the helmet during climbing
- C. An open face design for peripheral vision
- D. Reflective tape covering every external surface

163. Chainsaw-resistant leg protection works first by:

- A. Containing fibers that clog the chain on contact
- B. Activating an electromagnetic brake in the saw
- C. Reflecting the moving chain away from skin
- D. Producing an audible warning to the operator

164. OSHA first requires hearing protection when noise levels exceed:

- A. 30 decibels of normal conversation
- B. 50 decibels of quiet outdoor activity
- C. 85 decibels of typical chainsaw operation
- D. 120 decibels of extreme machinery use

165. The first elements of a proper pre-work job briefing are:

- A. Only the names of all crew members present
- B. Only the lunch break schedule for the crew
- C. Only the pricing of the day's planned work
- D. Work scope, hazards, PPE, and emergency procedures

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

- A. Only when working trees over 100 feet in height
- B. For essentially all climbing operations with a crew
- C. Only when electrical hazards are present at the site
- D. Only on weekends when EMS is delayed

167. Suspension trauma can first develop in a climber who:

- A. Remains motionless in a harness for an extended time
- B. Ascends a stationary line too quickly to the canopy
- C. Uses a harness that fits too tightly at the waist
- D. Switches between rope systems during a climb

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

- A. The bottom edge of the bar near the powerhead
- B. The middle of the cutting bar during use
- C. The upper portion of the bar tip
- D. The rear handle near the throttle control

169. The chainsaw chain brake is first designed to:

- A. Slow the chain to a smooth idle when not cutting
- B. Reduce vibration transmitted to the operator
- C. Prevent engine flooding during cold-weather starts
- D. Stop the chain when activated by kickback or hand

170. The first rule of the proper left-hand grip on a chainsaw is that:

- A. The thumb must be wrapped fully around the front handle
- B. Only fingertip contact should be used for quick release
- C. Loose contact is preferred to absorb engine vibration
- D. Palm contact with thumb alongside the handle is standard

171. Two-handed operation of a chainsaw is first considered:

- A. Optional based on operator preference and skill
- B. The standard practice for nearly all saw use
- C. Required only for felling very large mature trees
- D. Reserved only for cuts above the operator's head

172. Top-handle chainsaws are first designed specifically for:

- A. Cutting firewood at a residential woodlot
- B. Bucking large logs while standing on the ground
- C. Felling full-size mature trees in forestry
- D. Climbing arborist use in the canopy

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

- A. Sharpen the chain automatically during use
- B. Lubricate the chain during long cuts
- C. Catch the chain if it breaks during cutting
- D. Secure the chain to the bar during transport

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

- A. One-tenth of the rated tensile strength
- B. Half of the rated tensile strength
- C. Nine-tenths of the rated tensile strength
- D. Equal to the rated tensile strength itself

175. Shock loading in rigging first refers to:

- A. The static weight of the largest piece handled
- B. Dynamic forces from a falling piece suddenly caught
- C. Initial lifting force applied to a cut piece
- D. Electrical charge building up in a dry rope

176. The first method for reducing shock loading during a rigging catch is to:

- A. Tie the rigging line to a hard anchor with no slip
- B. Use the smallest-diameter rope that fits the load
- C. Position the ground worker beneath the falling piece
- D. Use a friction device to allow controlled slip

177. A block redirecting a rigging load over an anchor first 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 properly installed

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

- A. Be cut completely through before the tree falls
- B. Substitute for a proper notch in softwood species
- C. Control fall direction as the tree commits to falling
- D. Provide a decorative feature for the remaining stump

179. An escape route during felling operations should first be:

- A. Improvised at the moment of the fall
- B. Planned and cleared before cutting begins
- C. Always exactly straight behind the feller
- D. Directly beneath the expected fall line

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

- A. A resting position taken between difficult cuts
- B. A decorative form intentionally left in the stump
- C. A specialty chain used for resinous softwood
- D. Vertical splitting of the trunk during the back cut

181. Chipper operators should first feed branches into the machine:

- A. Butt end first while standing to the side of the infeed
- B. Tip first while standing directly behind the infeed
- C. Wearing loose clothing for quick escape if needed
- D. Only during evening hours to avoid overheating

182. Aerial lift operators near energized lines must first:

- A. Approach within one foot for efficient pruning
- B. Rely on rubber tires to isolate the lift electrically
- C. Maintain approach distance with both bucket and boom
- D. Maintain distance only at the bucket itself

183. Personal protective equipment should first be inspected:

- A. Only during annual company safety reviews
- B. Before every use, with damaged items retired
- C. Only after a known impact or failure event
- D. Only by the original equipment manufacturer

184. Under ANSI Z133, the first minimum tensile strength required for an arboricultural climbing rope is:

- A. 1,800 pounds for residential climbing work
- B. 3,000 pounds for routine maintenance work
- C. 10,000 pounds for any climbing operation
- D. 5,400 pounds per the current standard

185. A properly tied friction hitch should first:

- A. Grip reliably while permitting controlled adjustment
- B. Lock rigidly and never move under any load
- C. Be replaced after every single climb
- D. Slip continuously to allow rapid descent

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

- A. Indicate the speed of the chipping drum
- B. Meter lubricant to the feed roller bearings
- C. Stop the feed rollers in an emergency
- D. Switch the chipper between forward and reverse

187. When refueling a chainsaw, the first action the operator should take is to:

- A. Refuel quickly without removing the cap completely
- B. Keep the saw running at low idle during refueling
- C. Refuel with cut-resistant gloves still on the hands
- D. Stop the saw and allow it to cool briefly first

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

- A. Stored in a vehicle parked off the worksite
- B. Available on site and stocked appropriately
- C. Carried only by the designated safety officer
- D. Limited to basic over-the-counter medications only

189. Urban trees reduce the urban heat island effect first by:

- A. Releasing methane gas into the atmosphere
- B. Absorbing heat directly through root systems
- C. Shading surfaces and providing evapotranspiration cooling
- D. Reflecting sunlight from waxy leaf surfaces

190. A complete tree inventory first records which information?

- A. Every tree within the defined inventory area
- B. Only trees scheduled for immediate removal
- C. A statistical sample of the total population
- D. Only trees with obvious structural defects

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

- A. Identify unknown tree species from photographs
- B. Estimate the dollar value of ecosystem services
- C. Predict which specific trees will fail in storms
- D. Determine the genetic makeup of urban forests

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

- A. The tree has no visible defects of any kind
- B. A replacement tree of identical size is available
- C. The tree is a recently planted nursery specimen
- D. The tree is too large to replace with nursery stock

193. A typical tree protection ordinance first requires:

- A. Permits for removal of protected trees
- B. A ban on all pruning by private property owners
- C. Mandatory removal of mature trees over time
- D. Protection only for trees planted by the city

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

- A. The number of trees per square mile of city
- B. The total leaf biomass produced annually
- C. The percentage of land area covered by canopy
- D. The average height of street trees in feet

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

- A. Ten dollars per capita annually
- B. Two dollars per capita annually
- C. Fifty dollars per capita annually
- D. One hundred dollars per capita annually

196. Species rating in plant appraisal first reflects:

- A. The lumber value of the species at market
- B. The exact calendar age of the tree being valued
- C. The current height of the tree in feet
- D. The desirability and suitability in the local area

197. Communicating recommendations to a property owner should first use:

- A. Highly technical jargon to display expertise
- B. Pressure tactics to close the sale quickly
- C. Plain language with respect for the owner's decisions
- D. A refusal to provide any pricing estimate

198. Multiple studies first document which social or health benefit of urban trees?

- A. Improved mental health and reduced stress for residents
- B. Increased crime rates in heavily wooded neighborhoods
- C. Higher rates of asthma across all age groups
- D. Reduced physical activity among nearby residents

199. An urban forester advocating for canopy expansion before a budget-focused council should first emphasize:

- A. The aesthetic preferences of the forestry staff
- B. The documented dollar value of ecosystem services
- C. The simplicity of installing artificial turf instead
- D. The personal favorite tree species of the mayor

200. Street trees planted following the 10-20-30 rule first serve to:

- A. Require purchase from a single approved supplier
- B. Ensure every tree grows at the same rate
- C. Protect the community against catastrophic pest loss
- D. Reduce the total number of trees required

PRACTICE EXAM 12 — ANSWER KEY AND EXPLANATIONS

1. C — The vascular cambium divides inward to produce new xylem and outward to produce new phloem, thickening the trunk each year. Heartwood, bark, and pith do not produce new wood. The cambium is the engine of secondary growth.
2. A — Wall 1 is formed first as the tree plugs vertical xylem vessels with tyloses and resins to block upward and downward decay spread. It is the weakest of the four CODIT walls but is the first to form. Walls 2, 3, and 4 develop progressively as the response continues.
3. D — Water enters the tree first through the root epidermis and root hairs, which provide the primary absorbing surface. From there it moves through the root cortex into the xylem for upward transport. Root hairs dramatically increase absorbing surface area.
4. B — Closing stomata is the tree's immediate protective response to drought, conserving water by halting transpiration. This response is rapid and reversible. The trade-off is that photosynthesis also stops because CO₂ can no longer enter the leaf.
5. A — 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.
6. C — Leaf stomata must be open for transpiration to generate the evaporative tension that pulls water upward through xylem. The cohesion-tension mechanism depends on this leaf-level driving force. Without open stomata, the water column stops moving.
7. B — Spring bud break and refoliation are the first major demand on stored reserves, as the tree must produce new leaves before they can photosynthesize. This is why spring defoliation is so devastating — reserves are already depleted by this point. Reserves rebuild through summer.
8. D — Reserves reach their lowest point in late spring when new leaves have emerged and matured but have not yet returned more sugar than the refoliation cost. Spring defoliation during this window is particularly devastating. Reserves rebuild through summer and peak in autumn.
9. A — The branch collar contains the cambium that forms Wall 4 around a pruning wound. Preserving the collar intact is essential for proper compartmentalization. Flush cuts destroy the collar and eliminate Wall 4.

10. C — Xylem in the outer sapwood carries water upward from roots to leaves using the cohesion-tension mechanism. Phloem moves sugars downward, and cambium and pith are not conducting tissues. This division of labor is fundamental to tree physiology.
11. D — Phloem in the inner bark transports sugars from sources (typically leaves) to sinks (roots, growing tips, storage tissues). Unlike xylem, phloem requires active cellular processes for sugar transport. This is the fundamental difference between the two vascular tissues.
12. B — Auxin produced at the shoot tip travels downward and suppresses the growth of lateral buds below. Removing the leader interrupts this suppression and releases lateral buds to grow. This hormone-driven mechanism is the biological basis for many pruning responses.
13. A — The vascular cambium is the most metabolically active tissue in a mature trunk, dividing continuously to produce new xylem inward and new phloem outward. Heartwood and outer bark are dead; pith is essentially inactive in mature stems.
14. D — Mycorrhizal fungi colonize tree roots and extend hyphae outward into the surrounding soil, dramatically increasing the effective absorbing surface area. The tree supplies sugars; the fungus supplies access to water and nutrients from a much larger soil volume.
15. C — Most absorbing roots are concentrated in the upper 12 to 18 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.
16. B — Closing stomata simultaneously reduces transpiration (water loss) and photosynthesis (because CO₂ can no longer enter). This trade-off between water conservation and carbon gain is the central constraint on tree function under heat or drought stress.
17. A — Xylem conducting cells are dead at functional maturity, forming hollow tubes that transport water through the tree without requiring metabolic energy. This design is elegant because no respiration is needed to maintain the pipework. Phloem and cambium, in contrast, must remain living.
18. D — Wind flexing stimulates the cambium to produce reaction wood and develop greater trunk taper at the base. Rigidly staked trees lose this stimulus and develop weaker trunks. Naturally flexed trees build strength through mechanical stress.
19. C — The cohesion-tension theory relies on hydrogen bonding between water molecules, which holds the column of water together as it is pulled upward by transpiration tension. This cohesive strength allows trees to lift water hundreds of feet without active pumping.
20. B — Heartwood is composed entirely of dead cells with extractives (tannins, resins) deposited in the cell walls. It provides structural support and resists decay but no longer conducts water. Sapwood, by contrast, is the outer functional xylem.

21. A — A girdled tree typically declines over months to a few years as the root system gradually starves from lack of phloem sugar transport and then fails. Above-ground symptoms follow root failure rather than appearing immediately. This sequence is why girdling damage often goes unrecognized until too late.
22. C — Stomata regulate gas exchange (CO₂ in, O₂ and water vapor out) while controlling water loss. The trade-off between water conservation and carbon gain is the central constraint on tree function. This is why drought stress halts photosynthesis.
23. D — Identification begins with observing leaf arrangement, shape, and venation — the most accessible and diagnostic features. Opposite vs. alternate arrangement alone narrows possibilities significantly. Bark, buds, and form are secondary identification clues.
24. B — Leaf arrangement (opposite vs. alternate) is the first and most reliable clue for distinguishing major tree groups. Maples are opposite; oaks are alternate. The MAD Horse mnemonic exists precisely because this is the first narrowing step in identification.
25. C — Binomial nomenclature requires the genus capitalized and italicized in print, with the specific epithet lowercase and also italicized. *Acer rubrum* follows the convention correctly. All-caps and all-lowercase forms violate the rules.
26. A — MAD Horse stands for Maples, Ashes, Dogwoods, and Horse chestnut — the common temperate genera with opposite leaf arrangement. Most other broadleaf trees are alternate. This mnemonic eliminates most identification possibilities at a glance.
27. B — Right Tree, Right Place primarily means matching a tree's mature characteristics — size, form, soil and water needs, tolerance — to the conditions of the planting site. Mature size is particularly important. Ignoring mature dimensions is the most common species selection error.
28. D — White oaks have rounded leaf lobes without bristles and acorns that mature in a single growing season. Red oaks have pointed bristle-tipped lobes and acorns maturing over two seasons. These differences are the primary distinction between the two groups.
29. A — A tree with a mature height safely under 25 feet is appropriate for planting beneath a 30-foot distribution line, leaving safe clearance below the conductors. This is a direct application of Right Tree, Right Place. Mature size governs the selection.
30. C — A name in single quotation marks following a species name indicates a cultivar — a cultivated variety selected for specific characteristics and propagated clonally. Cultivar names are not italicized. They differ from botanical varieties found in wild populations.
31. 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. The hierarchy protects against threats at each taxonomic level. Dutch elm disease and emerald ash borer illustrate why diversity matters.

32. D — Tree of heaven (*Ailanthus altissima*) is widely classified as a non-native invasive species in much of eastern North America. It escapes cultivation and colonizes disturbed sites aggressively. It is also the preferred host of the spotted lanternfly.
33. A — Bald cypress (*Taxodium distichum*) is a deciduous conifer that sheds its needles each autumn. It is one of a small group of deciduous conifers including larch and dawn redwood. Hemlock, white pine, and red cedar are all evergreen.
34. C — Horse chestnut (*Aesculus hippocastanum*) has palmately compound leaves with five to seven leaflets, opposite arrangement, and showy upright spring flower spikes. It belongs to the soapberry family along with maples. It is the "Horse" in the MAD Horse mnemonic.
35. D — *Fraxinus* (the ash genus) belongs to the olive family Oleaceae, which also includes lilacs and forsythias. It is not a member of the pine, beech, or rose families. Family-level recognition matters for understanding pest susceptibilities.
36. B — Oak, hickory, and beech all have alternate leaf arrangement on their stems. The MAD Horse genera (maple, ash, dogwood, horse chestnut) are opposite. Recognizing alternate vs. opposite narrows identification quickly.
37. A — American sycamore (*Platanus occidentalis*) is distinguished by its mottled tan and gray peeling bark, which is visible from a distance. The bark alone often allows identification without examining leaves. Maples and hickories have very different bark patterns.
38. C — Native species have co-evolved with local ecological communities, including pollinators, insects, birds, and soil organisms. This adaptation is the genuine advantage. Claims of automatic pest immunity or guaranteed faster growth are overstatements.
39. B — A pinnately compound leaf has leaflets arranged along two sides of a central rachis, like the feathers of a bird. Palmately compound leaves have leaflets clustered at a single point. Ash, hickory, and walnut are pinnate.
40. D — Winter identification depends on bud shape, twig features, and bark character because foliage is absent. These features are reliable enough for confident identification. Experienced arborists can identify most deciduous trees from twigs alone.
41. B — Soil texture, drainage, and basic pH are the foundational soil characteristics that determine what species can succeed at a site. These properties should be evaluated before species selection or planting. Real estate value and wind direction are not primary soil concerns.
42. A — The pH scale runs from 0 to 14, with 7 as the neutral midpoint. Values above 7 are alkaline; values below 7 are acidic. Each whole number represents a tenfold change in hydrogen ion concentration.

43. D — Soil texture is classified by the relative proportions of sand, silt, and clay particles. Loam has a balanced mix; clay is dominated by fine particles; sand is dominated by coarse particles. Texture is the foundation of soil classification.
44. C — A composite soil sample sent to a testing lab provides reliable data on pH, nutrients, and organic matter before amendments are recommended. This diagnostic step should precede any treatment. Canopy surveys and aerial photographs do not substitute for soil data.
45. B — A proper mulch ring is 2 to 4 inches deep with the trunk base kept clear of mulch. Deeper layers can suffocate roots, and piling mulch against the trunk causes bark decay. The correct shape is a flat ring, not a volcano.
46. D — Restoring pore space through techniques like air excavation is the first priority when compaction is identified. Fertilization, tilling, and wetting agents do not address the underlying loss of pore space. Recovery depends on restoring soil structure.
47. A — Cation exchange capacity primarily depends on clay content and organic matter, both of which have negatively charged surfaces that hold cation nutrients. Building organic matter is the only practical way to raise CEC in sandy soils. Higher CEC means better nutrient retention.
48. C — An ideal soil contains approximately 50% pore space by volume, split roughly between water and air, with the remaining 50% as mineral solids and small organic fraction. Pore space is where roots, water, and air reside.
49. D — Iron chlorosis in a pin oak growing in alkaline soil is almost always caused by high pH rendering iron chemically unavailable. Testing soil pH is the first diagnostic step. Treatment must address pH or use chelated iron.
50. B — A perc test measures water drainage rate by filling a hole and timing how long water takes to drain. Drainage longer than 12 to 24 hours indicates inadequate drainage for most tree species. This test should precede site selection decisions.
51. A — Maintaining a continuous organic mulch layer at the soil surface is the most effective long-term practice for building organic matter. Mulch decomposes gradually, enriching the soil without disturbance. Tilling damages existing roots and structure.
52. C — Raised planting beds or surface grading for drainage is the first site modification for poorly drained soils. This approach physically lifts roots above the waterlogged zone. Lime, fertilizer, and geotextile do not solve drainage problems.
53. D — Soil texture is essentially permanent because the proportions of sand, silt, and clay cannot be meaningfully altered by any realistic amount of amendment. These proportions are determined by parent material and weathering. Working with existing texture is the only realistic strategy.

54. B — Bulk density above approximately 1.7 g/cm³ indicates severe compaction that halts most root growth. A reading of 1.8 is clearly in the severe range and must be the first priority. Values below 1.3 generally indicate good structure.
55. A — Locating the true root flare is the essential first step before digging a planting hole. The flare determines planting depth — the hole must be dug so the flare sits at or slightly above grade. Burying the flare is the most common serious planting error.
56. 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. The correct depth preserves the flare and allows for some settling without burial.
57. B — Current best practice is to backfill with the unamended native soil excavated from the planting hole. Research has shown that heavily amended backfill can produce pot-bound conditions in the ground. Soil improvement is better delivered through surface mulching.
58. D — Planting holes should be at least two to three times the diameter of the root ball to provide a zone of loosened soil for new roots to expand into. Width matters more than depth. A hole dug just to ball width offers no expansion zone.
59. A — Staking should be used only when necessary, typically when a site is windy enough that the tree cannot stand alone. Unnecessary or prolonged staking produces weaker trunks. The natural flex of the trunk builds strength and taper.
60. C — Circling roots found at planting should be cut or straightened before the tree is placed in the hole. Leaving them in place guarantees they will remain as permanent defects. Correction becomes impossible once the tree is backfilled.
61. D — Current best practice is to cut and remove at least the upper portion of the wire basket after the tree is set in the hole, along with burlap and twine contacting the trunk. Full removal risks damaging the ball; the lower portion can be left in place.
62. B — Planting too deep — burying the root flare — is the most common serious error in planting container-grown trees. The buried flare develops bark decay and girdling root problems that can take years to manifest. Finding and preserving the true flare is essential.
63. A — Establishment watering should keep the root ball and surrounding backfill consistently moist but not saturated. Both extremes are damaging — dry kills through desiccation and saturation kills through suffocation. Checking soil moisture directly is more reliable than fixed schedules.
64. C — Fertilization of a newly planted tree during its first growing season is generally unnecessary and can be counterproductive. A reduced root system cannot effectively use additional nitrogen, and forced top growth exceeds what the roots can support.

65. D — Dormancy — late fall after leaf drop or early spring before bud break — is the preferred transplanting window for most deciduous trees. The tree is not actively transpiring and the stress of root loss is minimized. Summer transplanting carries much higher risk.
66. A — Advance root pruning severs roots at the future root ball line one or more growing seasons before the move. The tree responds by producing new fibrous roots inside the line, which are harvested with the ball and dramatically improve transplant survival.
67. B — Twine tied around the trunk does not decompose reliably and can girdle the trunk as it grows. Synthetic twine in particular persists indefinitely. A single cut at planting prevents years of later damage.
68. D — A balled-and-burlapped tree must be lifted by supporting the root ball from underneath, never by the trunk. Lifting by the trunk can separate the trunk from the ball and destroy the root connection. This is one of the most basic handling rules.
69. C — Mulching does not supply all of a tree's nitrogen needs for the year, though it may contribute some nitrogen as it decomposes. Mulching does conserve moisture, moderate temperature, and suppress weeds. The other three benefits are genuine.
70. A — Planting hole depth should equal the distance from the root flare to the bottom of the root ball — no deeper. A deeper hole allows the tree to settle and bury the root flare, producing long-term decline. Width can be generous, but depth must be exact.
71. B — Nursery stock should be inspected at delivery for trunk condition, crown structure, visible root flare, and root ball condition. Defects identified at delivery can be avoided by rejecting the tree. Inspection is more than checking the manifest.
72. D — A tree that fails to leaf out the spring after planting most likely suffered root ball desiccation during handling. Damaged or dried-out roots cannot support bud break. Inspection at delivery and proper handling prevent most of these failures.
73. C — ANSI A300 is the American National Standard for Tree Care Operations and governs pruning and maintenance practices in the United States. ANSI Z133 addresses worker safety; the two complement each other.
74. A — A proper pruning cut is placed just outside the branch collar and bark ridge so the cambium at the wound edge can form Wall 4. Flush cuts and stubs both damage this mechanism. Correct placement is the biological foundation of good pruning.
75. B — Topping creates large wounds that cannot close, removes excessive foliage, depletes carbohydrate reserves, and produces weakly attached epicormic sprouts. It violates every principle of proper pruning simultaneously. ANSI A300 explicitly prohibits it.

76. D — The first cut is made on the underside of the branch, partway through, several inches beyond the final cut location. This undercut prevents bark tearing when the second cut releases the branch. The sequence is non-negotiable for branches heavy enough to tear bark.
77. C — Cleaning is the selective removal of dead, dying, diseased, broken, and weakly attached branches from the crown. It is one of the five primary pruning objectives recognized by ANSI A300 and the most common routine objective.
78. A — A reduction cut removes a branch back to a lateral large enough (typically at least one-third the diameter of the removed portion) to assume the terminal role. Heading cuts, by contrast, leave arbitrary stubs without regard to laterals.
79. B — Structural pruning during the juvenile phase produces the greatest benefit because small cuts now correct defects that would otherwise require much larger, more damaging cuts decades later. The architectural framework is still being established. Waiting until maturity is far less effective.
80. 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.
81. A — The branch bark ridge is a raised line of bark on the upper surface of a branch union, running outward along the stem from the crotch. It marks the dividing line between stem and branch tissue and is the reference for correct cut placement.
82. C — Lion-tailing strips interior foliage and concentrates weight at the branch ends, creating weaker branches than properly distributed thinning. The pattern removes interior foliage that cushions wind loads. It is explicitly discouraged under current standards.
83. B — Pollarding requires repeated cuts at the same framework points on an ongoing schedule, usually annually or biennially. It must be maintained once begun. Abandoning a pollarded tree produces weakly attached epicormic growth.
84. D — Restoration pruning develops an acceptable crown structure from sprouts that have emerged after topping, vandalism, or severe storm damage. It is a long-term process requiring multiple visits over years. It cannot undo the original damage.
85. A — Research has shown that wound dressings provide minimal benefit and in some cases actually slow compartmentalization by trapping moisture and creating favorable conditions for decay organisms. Current best practice is to leave pruning cuts unsealed.
86. C — In oak wilt regions, pruning of oaks should be postponed until dormancy to reduce the risk of attracting sap-feeding beetle vectors to fresh wounds. Timing is the primary defense. Dormant-season pruning minimizes transmission risk.

87. D — Subordination reduces the growth of a competing stem in favor of a dominant leader, gradually shifting dominance without the wound of outright removal. It is used to correct codominant stems in young trees.
88. B — 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.
89. 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.
90. C — Bypass hand pruners cut cleanly without crushing living wood and are the correct choice for branches up to about one inch in diameter. Anvil blades tend to crush living tissue. Matching tool to branch size is basic professional practice.
91. D — A pole pruner is most appropriate for small-diameter branches out of reach from the ground that do not warrant climbing. Larger branches require more controlled methods. Whole-tree felling and full-canopy work require different tools.
92. B — Removing 50% of live foliage from a mature tree far exceeds the 10 to 15% guideline and would initiate decline. The professional response is to explain that thinning of that magnitude violates accepted standards and propose an appropriate alternative.
93. A — Codominant stems with included bark should be corrected early, while the tree is young and the cuts are small. Subordination or removal shifts dominance to a single leader. Waiting until maturity requires much larger and more damaging cuts.
94. C — The raise objective refers to selective removal of lower branches to provide vertical clearance beneath the crown for pedestrians, vehicles, or sight lines. Raising should be done gradually on young trees to avoid producing a disproportionate crown.
95. B — 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.
96. D — A professional pruning specification should include the identified objective, the percentage of foliage to be removed, and the diameter range of cuts. The climber's personal preferences are not part of a professional specification — clear specifications protect tree, client, and arborist.
97. A — Bypass loppers extend the principle of hand pruners to branches up to approximately one and a half to two inches in diameter, using long handles for mechanical advantage. Smaller branches are better handled by hand pruners.

98. C — Removing a dead branch is part of the cleaning pruning objective, which is defined as selective removal of dead, dying, diseased, broken, and weakly attached branches. Cleaning is the most common routine pruning objective.
99. D — The placement of the cut relative to the branch collar is the single most important factor in whether a pruning wound closes successfully. Correct placement preserves the cambium that forms Wall 4; incorrect placement eliminates it.
100. B — Establishing the intended pruning objective clearly is the first precaution before any pruning job. The objective drives every subsequent decision about which branches to cut and where. Without a clear objective, pruning becomes arbitrary.
101. A — Diagnosis begins with identifying the species and understanding its normal characteristics, because a symptom cannot be evaluated without knowing what a healthy specimen looks like. Jumping to treatment leads to routine misdiagnosis.
102. D — A sign is direct evidence of the causal agent itself — fungal fruiting bodies, visible insects, or confirmed pathogens. Signs are more reliable than symptoms because they point directly to a cause rather than to the tree's response.
103. C — A symptom is the tree's response to a problem — wilting, yellowing, dieback, thinning. Symptoms indicate that something is wrong but usually do not identify the specific cause. Multiple problems can produce overlapping symptoms.
104. B — A primary pest can attack and kill healthy, vigorous trees on its own without requiring the host to be stressed first. Secondary pests, by contrast, attack only weakened trees. The distinction is critical for management.
105. A — Emerald ash borer is classified as a primary pest because it can successfully attack and kill healthy ash trees of all sizes. This distinguishes it from most native wood borers and is why it has devastated ash populations across North America.
106. D — IPM is a decision-making framework that integrates monitoring, action thresholds, multiple control tactics, and outcome evaluation. It is not a specific product or a prohibition on pesticides. The least toxic effective option is preferred when chemical control is warranted.
107. B — Fire blight is caused by the bacterium *Erwinia amylovora* and affects members of the rose family (Rosaceae), including apple, pear, hawthorn, and serviceberry. Family-level recognition matters because susceptibility extends across the family.
108. C — Oak wilt spreads through root grafts between adjacent oaks and through sap-feeding beetles attracted to fresh wounds. The beetle-vector pathway makes warm-season pruning of oaks particularly risky in affected regions.

109. A — Iron is an immobile nutrient, and deficiency appears first on new leaves as interveinal chlorosis with green veins. The tree cannot translocate iron from older foliage. In landscape settings, this is almost always a pH-related availability problem.
110. D — Nitrogen is a mobile macronutrient that the tree translocates from older leaves to support new growth when supply is inadequate. Deficiencies therefore appear first on older inner leaves as uniform yellowing. All mobile-nutrient deficiencies follow this pattern.
111. B — Cupping and twisting of new growth on a mature tree most likely indicates phenoxy herbicide exposure such as 2,4-D, which mimics plant growth hormones. The pattern is often most severe on the side nearest the application source.
112. C — Delayed decline several years after construction almost always reflects root damage that occurred during the work. Trees mobilize reserves to mask initial injury, and visible symptoms typically appear one to three years later when reserves are exhausted.
113. A — Anthracnose is a general term for several fungal leaf diseases that produce spots, blotches, and leaf distortion, often followed by premature leaf drop. Most anthracnose infections are cosmetic rather than life-threatening. Sycamore anthracnose is a particularly visible example.
114. D — Armillaria root rot produces characteristic white mycelial sheets (fungal tissue) beneath the bark of infected roots, visible when the bark is peeled back. Honey-colored mushrooms may also appear at the base in fall.
115. B — Dutch elm disease is a vascular wilt spread primarily by elm bark beetles carrying fungal spores and by root grafts between adjacent elms. This dual pathway is why the disease caused the near-total loss of American elm as a street tree.
116. C — Trunk injection of systemic insecticides is most appropriate for high-value trees threatened by borers, where foliar sprays would be impractical or ineffective for reaching internal tissues. Injection provides rapid systemic translocation with low environmental exposure.
117. D — "The label is the law" means pesticide product labels are legally enforceable federal documents that must be read and followed exactly. Applications must match the uses, rates, sites, and methods authorized on the label, and deviations carry legal and liability consequences.
118. A — When no effective treatment exists, the professional response is to communicate the diagnosis honestly and recommend appropriate management, which may include monitoring, removal, or supportive care. Honesty is part of professional standing.
119. B — Calculating and clearly marking the Critical Root Zone is the essential first step before any construction work near a mature tree. The CRZ defines the protection boundary that all subsequent decisions must respect. Without this step, protection cannot be enforced.

120. C — 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.
121. D — Tree protection fencing should be placed at the calculated CRZ boundary or further from the trunk. Placing fencing at the dripline or closer leaves significant root area exposed. The CRZ formula produces a more defensible boundary.
122. A — The high pH of cement washwater can sterilize soil and kill roots in the affected area. Concrete washout within a TPZ is among the most damaging activities on construction sites and must be explicitly prohibited.
123. B — 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.
124. C — Directional boring or tunneling passes a utility beneath the root zone without disturbing the soil at root depth. Conventional open-cut trenching through the CRZ is the most damaging option. Higher equipment cost typically favors boring when tree value is significant.
125. D — Storage of construction materials within a TPZ is prohibited because stockpiles compact the underlying soil under their weight and smother roots. This is one of the standard prohibitions enforced by TPZ fencing.
126. A — Pre-construction tree assessment should occur before final design so findings can influence project decisions. Assessment after drawings are complete is reduced to documentation of what has already been decided.
127. C — An arborist supervising unavoidable root impacts should make clean cuts with sharp tools at the damage line before excavation begins. Clean cuts produce better wound responses than the tearing and crushing from unprepared excavation.
128. B — Post-construction care includes deep periodic watering, generous mulching, conservative pruning focused on deadwood and safety, and annual monitoring for at least three to five growing seasons. Patience drives recovery.
129. D — 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.
130. A — Delayed decline following construction damage typically becomes visible months to several years after the triggering event. Trees mobilize reserves to mask initial injury, and when reserves are exhausted, decline begins. Monitoring should continue for at least three to five growing seasons.

131. C — 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.
132. B — 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.
133. A — Lowering the grade removes soil along with any roots growing in it, producing immediate direct loss of functional root tissue. Even a few inches of grade cut can remove a large share of absorbing roots concentrated near the surface.
134. D — A baseline condition report documents pre-existing tree conditions for later comparison. It protects all parties when damage is alleged after construction, allowing actual damage to be distinguished from pre-existing conditions.
135. C — A tree showing no visible symptoms one year after construction should still be monitored for delayed decline for additional seasons, because symptoms can appear one to three years later as reserves are exhausted. Early apparent survival is not the same as long-term recovery.
136. B — Hand or air excavation allows workers to identify and preserve roots individually rather than severing them blindly. These techniques trade labor cost for root preservation and are appropriate when roots must be crossed.
137. A — Risk is formally defined as the combination of likelihood of failure and severity of consequences. Neither tree condition nor target presence alone constitutes risk. Both factors must be considered together.
138. D — A Level 2 assessment is a detailed visual inspection of an individual tree, typically performed while walking around it from multiple angles using basic tools such as a mallet and probe. It is the standard level for trees of concern.
139. B — Level 1 assessment is a rapid limited visual screening used for large tree populations along streets, through parks, or across properties. Its purpose is to identify obvious hazards requiring further evaluation.
140. C — Included bark between codominant stems prevents the formation of a strong structural union. The attachment becomes progressively weaker as the stems grow, and catastrophic splitting can occur without warning.
141. A — The presence of a fungal fruiting body on a trunk indicates that active decay is already established within the tree's tissues. Fruiting bodies are the reproductive stage of fungi whose vegetative bodies extend into the tree.

142. D — A target is any person, property, or activity that could be affected by a failing tree or tree part. Targets include pedestrians, vehicles, buildings, utility lines, and outdoor activities. Without targets, even high failure likelihood does not produce high risk.
143. B — Target occupancy rate formalizes the frequency and duration of target presence within the potential strike zone. Higher occupancy contributes to higher overall risk because failures are more likely to coincide with target presence.
144. C — A new lean combined with fresh soil cracking on the opposite side indicates root plate movement and elevated risk of uprooting failure. Trees showing these signs should be considered at imminent risk. Immediate action may be warranted.
145. A — Sounding the trunk with a mallet produces a solid ringing sound over intact wood and a dull hollow sound over decayed or hollow areas. It is a simple but useful technique for detecting large decay columns that might otherwise be missed visually.
146. D — The TRAQ risk matrix combines likelihood of failure and impact (probability that failure will occur and strike a target) with consequences of failure (severity if impact occurs). The combination produces the overall risk rating.
147. C — A probable likelihood of failure in TRAQ means failure is likely to occur during the assessment time frame under normal conditions. The four levels are improbable, possible, probable, and imminent.
148. B — The severe consequence level in TRAQ applies to catastrophic property damage, serious injury, or death. Minor consequences involve minor damage or injury; significant consequences fall between.
149. A — A tree with an internal cavity may still be structurally sound if sufficient intact wood remains around the cavity perimeter to resist bending forces. A common guideline holds that at least one-third of the diameter should remain as sound wood.
150. D — Consequences of failure depend on the size of the falling part, the height from which it would fall, and the nature of the target it would strike — all three factors together. A single factor in isolation cannot predict severity.
151. B — Residual risk is the risk that remains after mitigation measures have been implemented. No mitigation eliminates risk entirely — pruned trees can still fail, cabled unions can still split. Clients must understand they are choosing acceptable risk levels.
152. C — A professional report should document scope, defects, targets, mitigation, and residual risk — but not a removal recommendation for every tree. Recommendations must be proportional to actual risk. Blanket removal recommendations damage professional credibility.

153. D — Level 3 assessment techniques include resistograph drilling, sonic tomography, static load testing, and other advanced instrumentation. These tools are reserved for high-value trees or situations where Level 2 has left significant uncertainty.
154. A — Cabling and bracing provide supplemental support that reduces but does not eliminate structural risk. The installations require ongoing inspection and maintenance. They are appropriate when defects cannot be addressed by pruning alone.
155. B — Effective client communication uses plain language, presents options rather than ultimatums, and respects the owner's decision-making authority. Technical jargon, pressure tactics, and withholding information all damage credibility.
156. C — Root defects are difficult to evaluate because roots are below ground and cannot be directly observed. Arborists rely on indirect indicators such as root plate movement, fungal fruiting bodies at the flare, and construction history.
157. A — Healthy rounded callus tissue around a small old wound indicates successful compartmentalization and closure. This is evidence of normal healing, not a structural defect. The other options are all genuine defects.
158. D — Reduction pruning to decrease end weight on an overextended branch is a standard mitigation for moderate risk from specific branch defects over targets. It addresses the identified defect without removing the entire tree.
159. C — ANSI Z133 is the American National Standard for Arboricultural Operations — Safety Requirements and is the principal safety standard for tree care work in the United States. ANSI A300 addresses pruning; Z133 addresses safety.
160. B — The minimum approach distance for unqualified workers to energized distribution lines below 50 kV is 10 feet under ANSI Z133. This is the most commonly cited MAD figure and applies to most lines in residential and commercial tree work.
161. D — A qualified line-clearance arborist has completed specialized training in electrical hazards, safe work procedures near energized lines, use of insulated tools, and emergency response to electrical contact. This training cannot be acquired informally.
162. B — A climbing helmet must have a chin strap to retain the helmet during active climbing, rigging, and inverted positions. Traditional construction hard hats without chin straps can fall off during dynamic movement.
163. A — Chainsaw-resistant leg protection contains cut-resistant fibers (ballistic nylon or aramid) that clog the chain of a running saw on contact, stopping the chain before it reaches the leg. The protection dramatically reduces injury severity.

164. 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.
165. D — A proper job briefing covers work scope, hazards, procedures and precautions, required PPE, and emergency response procedures. It is required under ANSI Z133 and is not optional. Briefings prevent predictable mistakes.
166. B — ANSI Z133 requires aerial rescue capability on essentially every climbing operation with a crew — at least one worker other than the climber must be trained and equipped to perform a rescue. Outside emergency services alone are inadequate.
167. A — Suspension trauma develops when a climber remains motionless in a harness for an extended period, as reduced venous return causes blood to pool in the legs. It can become life-threatening within 30 minutes.
168. C — The kickback zone is the upper portion of the bar tip. Contact between this area and any object can trigger a violent upward and backward reaction. Awareness of tip position throughout every cut is a foundational safety skill.
169. D — The chain brake is designed to stop the chain when activated manually by the front handguard or automatically by kickback motion. It is an essential safety feature that must be functional on every saw in service.
170. A — The left hand should grip the front handle with the thumb wrapped fully around the handle. This grip is stronger and provides better control if the saw moves unexpectedly. It is the standard grip for all chainsaw operation.
171. B — Two-handed operation is the standard practice for nearly all chainsaw use and is required except in specific climbing situations using top-handle saws. The standard grip provides maximum control and reduces injury risk.
172. D — Top-handle chainsaws are designed specifically for climbing arborist use up in the canopy, where compact size and potential one-handed operation are required. They should not be used by untrained workers or for ground-based work.
173. C — The chain catcher is a projection beneath the bar designed to catch the chain if it breaks or derails during operation, preventing it from whipping toward the operator. It is one of several safety features on modern chainsaws.
174. A — Working load limit is commonly calculated as approximately one-tenth of the tensile strength of rigging equipment. A rope with 14,000 pounds tensile strength has a WLL of about 1,400 pounds. This margin protects against shock loading and wear.

175. B — Shock loading is the dynamic force generated when a falling piece is suddenly caught by the rigging rope. Peak forces can be many times the static weight of the piece depending on fall distance and system elasticity.
176. D — Allowing controlled slip through a friction device such as a Port-a-Wrap distributes the energy of the catch over time rather than stopping the load instantly. The result is a dramatically lower peak force compared to a hard tie-off.
177. A — A block redirecting a rigging load over an anchor experiences approximately twice the force of the load itself, because the block holds both the lifting side and holding side of the rope simultaneously. This doubling is a routine source of anchor failure.
178. C — 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. B — An escape route must be planned and cleared before cutting begins and followed immediately as the tree starts to fall. The route should lead away from the tree at about 45 degrees from the fall line on the opposite side.
180. D — Barber chair is a vertical splitting of the trunk upward along the grain during the back cut, caused by cutting the hinge too thin or making the back cut too slowly. It can propel trunk sections backward at high speed.
181. A — Chipper operators should feed branches butt end first while standing to the side of the infeed. Standing to the side avoids struck-by hazards from branches that flex or kick back. Standing directly behind is a recurring cause of serious injury.
182. C — Aerial lift operators must maintain the minimum approach distance with both the bucket and the boom, because the metal boom is an excellent conductor and can carry electricity from a contacted line throughout the machine.
183. B — PPE must be inspected before every use, and items showing damage, wear, or contamination must be retired immediately and replaced. Continuing to use compromised PPE provides reduced or no protection. Annual inspection alone is inadequate.
184. D — ANSI Z133 requires climbing ropes to have a tensile strength of at least 5,400 pounds for arboricultural climbing applications. This value provides the margin needed for the dynamic loads generated during climbing and rigging.
185. 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.

186. C — The feed control bar on a wood chipper is a safety device that stops the feed rollers when pressed, allowing the operator to halt material feed in an emergency. It must be functional and within reach.
187. D — Chainsaws should be stopped and allowed to cool briefly before refueling. Refueling a running or hot saw risks fire from spilled fuel contacting hot components. This is one of the basic safety rules of power equipment handling.
188. B — A first aid kit should be available on every tree care worksite and stocked appropriately for the hazards of the work. This includes supplies for treating chainsaw lacerations, bleeding, and minor injuries that occur routinely.
189. C — Urban trees reduce the urban heat island effect through shading of surfaces and evapotranspiration cooling. Paved cities can be 5 to 10 degrees warmer than surrounding areas, and tree canopy substantially reduces this difference.
190. A — A complete tree inventory records every tree within the defined inventory area, with information on species, size, condition, location, and management needs. Sample inventories cover a statistically representative subset.
191. B — The i-Tree suite developed by the USDA Forest Service allows communities to estimate the dollar value of ecosystem services — stormwater interception, air quality improvement, carbon sequestration, and energy savings — provided by their tree populations.
192. D — The trunk formula method is used when a tree is too large to be practically replaced by nursery stock. It calculates value from trunk cross-sectional area adjusted by species, condition, and location ratings.
193. A — Tree protection ordinances typically require permits for removal of protected trees above a specified size threshold, with penalties for unauthorized removal. Specific provisions vary between jurisdictions.
194. C — Canopy cover goals are typically expressed as the percentage of land area covered by tree canopy, measured through aerial imagery analysis. They provide a high-level metric for tracking urban forest size and communicating progress to the public.
195. B — Tree City USA requires a community forestry budget of at least two dollars per capita annually, along with a tree board, tree care ordinance, and Arbor Day observance. The program recognizes baseline commitment to urban forestry.
196. D — Species rating in plant appraisal reflects the desirability and suitability of the species in the local area. High-quality species well adapted to the location receive higher ratings; invasive or poorly suited species receive lower ones.

197. C — Effective communication with property owners uses plain language and respects the owner's decision-making authority. Technical jargon, pressure tactics, and refusal to share information all damage credibility. The client makes the final decision.
198. A — Multiple studies have found improved mental health outcomes and reduced stress for residents of neighborhoods with more trees, along with faster recovery from illness and increased physical activity. The human-health case is increasingly central.
199. B — A budget-focused council responds to the documented dollar value of ecosystem services and infrastructure savings, not to aesthetic arguments or staff preferences. Matching the message to the audience is basic professional communication.
200. 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.