

FULL-LENGTH PRACTICE TESTS

PRACTICE TEST 5 - 100 QUESTIONS

1. Which tissue layer is responsible for producing new xylem cells toward the inside and new phloem cells toward the outside of a tree trunk?
 - A. Vascular cambium
 - B. Cork cambium
 - C. Pith
 - D. Epidermis

2. When removing a branch using the three-cut method, what is the purpose of the first undercut?
 - A. To establish the final cut angle
 - B. To remove the branch weight
 - C. To stimulate wound closure
 - D. To prevent bark tearing when the branch falls

3. A soil with approximately equal proportions of sand, silt, and clay is classified as what texture?
 - A. Sandy clay
 - B. Loam
 - C. Silty clay
 - D. Pure clay

4. What is the term for leaves that are divided into multiple separate leaflets attached to a central stalk?

- A. Simple leaves
- B. Lobed leaves
- C. Compound leaves
- D. Entire leaves

5. According to ANSI Z133, when working near electrical conductors, what must occur if minimum approach distances cannot be maintained?

- A. Work may proceed with rubber gloves
- B. Work may continue if only using wooden tools
- C. The climber must stay on the opposite side of the tree
- D. The utility company must de-energize or protect the lines before work begins

6. Crown cleaning as defined by ANSI A300 involves the removal of which types of branches?

- A. Dead, dying, diseased, crowded, weakly attached, and broken branches
- B. Only dead branches
- C. All branches below a specified height
- D. Branches to reduce crown density

7. What soil property describes the proportion of pore space filled with air or water?

- A. Soil texture
- B. Cation exchange capacity
- C. Soil porosity
- D. Soil structure

8. In the CODIT model, Wall 4 represents what type of barrier?

- A. Plugged xylem vessels
- B. The barrier zone formed by new wood after wounding
- C. Ray cells limiting lateral spread
- D. Annual ring boundaries

9. A tree inspection reveals a large cavity in the trunk with only a thin shell of sound wood remaining. What is the primary concern with this condition?

- A. Structural failure due to inadequate load-bearing capacity
- B. Increased photosynthetic demand
- C. Excessive water loss
- D. Reduced fruit production

10. What type of climbing system uses a rope that passes over a branch and returns to the climber with both ends accessible?

- A. Single rope technique (SRT)
- B. Fixed line system
- C. Mechanical ascender system
- D. Moving rope technique (MRT) or doubled rope technique (DRT)

11. The movement of water from roots to leaves through xylem is primarily driven by what force?

- A. Root pressure alone
- B. Active pumping by xylem cells
- C. Transpirational pull and cohesion-tension
- D. Osmotic pressure in leaves

12. What is the recommended depth for mulch application around landscape trees?

- A. 6 to 8 inches
- B. 2 to 4 inches
- C. 1 inch or less
- D. 8 to 12 inches

13. Which leaf arrangement describes leaves emerging singly at each node in an alternating pattern along a stem?

- A. Opposite
- B. Whorled
- C. Fascicled
- D. Alternate

14. Ganoderma species producing shelf-like conks at the base of trees indicate what condition?

- A. Root and butt rot with significant decay
- B. Beneficial mycorrhizal activity
- C. Minor surface infection only
- D. Improved structural integrity

15. When should guy wires used to support a newly transplanted tree typically be removed?

- A. After 5 years
- B. When the tree reaches mature height
- C. After 1 to 2 growing seasons once roots establish
- D. Never; they should remain permanently

16. A brace rod differs from a cable in that it provides what type of support?

- A. Flexible support allowing movement
- B. Rigid direct support at the point of attachment
- C. Ground-level anchoring
- D. Support from an adjacent tree

17. What is the function of the pericycle tissue in roots?

- A. Absorbing water and nutrients
- B. Conducting sugars downward
- C. Storing carbohydrates only
- D. Initiating lateral root development

18. Which plant hormone inhibits growth and promotes dormancy during unfavorable conditions?

- A. Abscisic acid
- B. Auxin
- C. Gibberellin
- D. Cytokinin

19. The formula for calculating critical root zone radius using trunk diameter is based on what measurement?

- A. Crown spread in feet
- B. Tree height in feet
- C. One foot of radius per inch of trunk diameter (DBH)
- D. Root depth in inches

20. Bark beetles that attack stressed trees and can introduce fungal pathogens are considered what type of pest?

- A. Primary pests attacking healthy trees
- B. Secondary pests attacking weakened trees
- C. Beneficial insects
- D. Parasitoid insects

21. What is the appropriate treatment for a fresh pruning wound on a healthy tree?

- A. Apply wound dressing to seal the cut
- B. Paint with latex paint
- C. Apply fungicide to prevent infection
- D. Leave the wound untreated to close naturally

22. Vascular wilt diseases like Dutch elm disease and oak wilt affect trees by colonizing what tissue?

- A. Xylem vessels
- B. Phloem tissue
- C. Root cortex
- D. Leaf mesophyll

23. In tree risk assessment, what three components are evaluated to determine overall risk rating?

- A. Species, age, and location
- B. Likelihood of failure, likelihood of impacting target, and consequences
- C. Height, diameter, and crown spread
- D. Soil type, drainage, and pH

24. The outer protective layer of bark that includes cork cells is called what?

- A. Phloem
- B. Vascular cambium
- C. Periderm
- D. Sapwood

25. What condition is most likely when a tree shows dieback on one side of the crown corresponding to visible root damage on the same side?

- A. Uniform nutrient deficiency
- B. Viral infection
- C. Genetic abnormality
- D. Root loss affecting the corresponding crown section

26. The process of photosynthesis primarily occurs in which leaf tissue layer?

- A. Mesophyll (palisade and spongy parenchyma)
- B. Epidermis
- C. Cuticle
- D. Vascular bundles

27. What is the primary purpose of establishing tree protection zones during construction?

- A. To increase construction efficiency
- B. To prevent soil compaction and root damage
- C. To mark trees for removal
- D. To identify hazard trees

28. A tree exhibits small leaves, short internodes, early fall color, and sparse crown over several years. This pattern is most consistent with what diagnosis?

- A. Acute bacterial infection
- B. Herbicide damage
- C. Nutrient toxicity
- D. Chronic stress and decline

29. Which factor most strongly influences how well a tree can compartmentalize decay after injury?

- A. The time of year when injury occurs
- B. The species of decay fungus
- C. Tree vigor at the time of wounding
- D. The age of the tree only

30. What should be done with synthetic straps or treated burlap when planting a balled-and-burlapped tree?

- A. Remove completely as they will not decompose
- B. Leave intact to support the root ball
- C. Bury deeper for stability
- D. Treat with fertilizer to speed decomposition

31. Soil compaction reduces tree root health primarily by limiting what?

- A. Soil temperature regulation
- B. Oxygen availability and water infiltration
- C. Beneficial fungal activity only
- D. Nutrient concentrations

32. Which of the following represents proper pruning cut placement?

- A. Flush with the trunk to minimize wound size
- B. Leaving a 6-inch stub
- C. Through the branch collar
- D. Just outside the branch collar preserving the collar tissue

33. What characteristic distinguishes ectomycorrhizal fungi from endomycorrhizal fungi?

- A. Ectomycorrhizae only infect diseased roots
- B. Endomycorrhizae form visible mantles around roots
- C. Ectomycorrhizae form a sheath around roots without penetrating cell walls
- D. They function identically with no distinguishing features

34. When a heading cut is made on a branch, what is the typical growth response?

- A. Multiple shoots developing from buds below the cut
- B. Single replacement branch with strong attachment
- C. No regrowth occurs
- D. Root suckering begins

35. The recommended maximum percentage of live crown to remove from a mature tree in a single pruning operation is what?

- A. 50 percent
- B. 25 percent
- C. 10 percent
- D. 40 percent

36. What is the primary difference between a complete tree inventory and a sample inventory?

- A. Complete inventories are less accurate
- B. Sample inventories cost more
- C. Complete inventories only record species
- D. Complete inventories document every tree while sample inventories use statistical sampling

37. Which nutrient deficiency typically causes interveinal chlorosis on the youngest leaves?

- A. Iron or manganese
- B. Nitrogen
- C. Potassium
- D. Phosphorus

38. What is the proper response when electrical lines are encountered unexpectedly during tree work?

- A. Continue work if the lines appear insulated
- B. Touch the lines to test if they are energized
- C. Stop work immediately and contact the utility company
- D. Cut the lines to eliminate the hazard

39. Trees growing in containers too long develop what root condition that can cause long-term problems?

- A. Excessive taproot development
- B. Circling and potentially girdling roots
- C. Immediate root death
- D. Beneficial root architecture

40. What term describes a tree that has structural defects AND is located where failure could strike a target?

- A. Defective tree
- B. Declining tree
- C. Dead tree
- D. Hazard tree

41. The apical meristem is responsible for what type of growth?

- A. Primary growth (elongation of shoots and roots)
- B. Secondary growth (increase in diameter)
- C. Bark formation
- D. Wound closure

42. What is the recommended irrigation approach for a newly planted tree during establishment?

- A. Light daily watering of the surrounding soil
- B. Weekly deep watering regardless of conditions
- C. Frequent watering of the root ball, adjusting based on soil moisture and weather
- D. No supplemental irrigation needed if mulch is applied

43. Which type of root damage is most harmful to tree survival?

- A. Loss of fine roots only
- B. Severing roots close to the trunk affecting a large percentage of the root system
- C. Damage to roots beyond the dripline
- D. Surface root exposure

44. Fire blight is a bacterial disease that primarily affects trees in which plant family?

- A. Pinaceae
- B. Fagaceae
- C. Betulaceae
- D. Rosaceae

45. What information does the condition rating in the trunk formula method of tree appraisal reflect?

- A. The tree's health and structural condition
- B. The species' suitability for the site
- C. The tree's location relative to structures
- D. The replacement cost of nursery stock

46. Which situation would most likely require an advanced tree risk assessment using specialized equipment?

- A. A healthy tree with no visible defects
- B. A tree with minor deadwood in the outer crown
- C. A tree with suspected extensive internal decay not visible externally
- D. A recently planted tree

47. Proper tie-in point selection for climbing requires a branch with what minimum characteristics?

- A. Any branch that supports the climber's weight initially
- B. Live wood at least 4 inches in diameter with sound attachment
- C. Dead wood is acceptable if diameter is adequate
- D. Minimum diameter of 1 inch

48. What is the purpose of a job hazard analysis conducted before tree work?

- A. To calculate the cost of the job
- B. To document tree species for the client
- C. To establish warranty terms
- D. To identify hazards and determine how they will be controlled

49. Trees respond to wounding by producing callus tissue from what structure?

- A. Cambium at wound margins
- B. Pith cells
- C. Heartwood
- D. Root tips

50. What is the most effective long-term treatment for soil compaction in a tree's root zone?

- A. Surface fertilizer application
- B. Foliar spray applications
- C. Prevention combined with organic matter incorporation and vertical mulching
- D. Heavy irrigation

51. The 10-20-30 rule for urban forest diversity refers to limits on what?

- A. Tree heights, widths, and ages
- B. Species, genus, and family representation percentages
- C. Planting densities in different zones
- D. Maintenance budget allocations

52. What type of support system uses ground anchors with cables or straps attached to the trunk?

- A. Cabling
- B. Bracing
- C. Propping
- D. Guying

53. When pruning to reduce the height of a tree, what type of cut should be used?

- A. Reduction cuts to appropriate lateral branches
- B. Heading cuts to random points
- C. Topping cuts at a uniform height
- D. Flush cuts removing all branches

54. During drought conditions, trees conserve water by what mechanism?

- A. Increasing root growth rate
- B. Expanding leaf area
- C. Closing stomata to reduce transpiration
- D. Increasing photosynthesis rate

55. Which of the following pest management approaches focuses on modifying the environment to make it less favorable for pests?

- A. Chemical control
- B. Cultural control
- C. Classical biological control
- D. Augmentative biological control

56. What is the significance of the branch bark ridge in making pruning cuts?

- A. It should be removed completely
- B. It indicates where to apply wound dressing
- C. It marks where the cut should begin
- D. It indicates the top of the branch attachment and helps guide proper cut angle

57. The minimum approach distance from electrical conductors increases above what voltage threshold?

- A. 50 kV
- B. 100 kV
- C. 25 kV
- D. 10 kV

58. What is the primary purpose of thinning cuts in pruning?

- A. To stimulate dense regrowth
- B. To create stubs for wildlife habitat
- C. To reduce density while maintaining the tree's form by removing branches at their origin
- D. To lower the height of the tree

59. Foliar analysis (tissue testing) provides what information that soil testing cannot?

- A. Soil pH levels
- B. What nutrients the tree has actually absorbed
- C. Soil texture classification
- D. Organic matter content

60. What is the recommended action if a tree fails a pull test of the climbing system before ascending?
- A. Proceed with caution
 - B. Use a heavier rope
 - C. Add additional friction hitch wraps
 - D. Select a different tie-in point and retest
61. In the plant health care approach, what is emphasized over reactive pest treatment?
- A. Prevention and maintaining plant health
 - B. Calendar-based pesticide applications
 - C. Immediate pesticide application at first pest sighting
 - D. Removing all affected plants
62. Which wound position is most serious for tree structure: basal wounds or wounds high in the crown?
- A. Wounds high in the crown are always most serious
 - B. Wound position does not affect tree structure
 - C. Basal wounds affecting the lower trunk are most serious for structural stability
 - D. All wounds are equally serious regardless of location
63. What is the term for the increase in trunk and branch diameter that occurs each year?
- A. Primary growth
 - B. Secondary growth
 - C. Apical growth
 - D. Terminal extension

64. When should young trees be trained with structural pruning?

- A. Only after reaching mature size
- B. After significant defects develop
- C. Only during winter dormancy
- D. Beginning early when branches are small and corrections require minor cuts

65. Anthracnose diseases are caused by what type of organism?

- A. Fungi
- B. Bacteria
- C. Viruses
- D. Nematodes

66. What is the function of the root cap at the tip of a growing root?

- A. Absorbing nutrients
- B. Storing carbohydrates
- C. Protecting the root meristem and lubricating passage through soil
- D. Producing lateral roots

67. A tree risk assessment identifies a dead branch over a heavily used sidewalk. What risk component does the sidewalk represent?

- A. Likelihood of failure
- B. Target
- C. Consequence severity
- D. Defect

68. What is the appropriate mulch placement in relation to the tree trunk?

- A. Piled against the trunk for moisture retention
- B. In a ring touching the trunk
- C. Covering the root flare completely
- D. Pulled back several inches from the trunk (no trunk contact)

69. The production of adventitious roots above the normal root zone often indicates what problem?

- A. Tree was planted too deeply or trunk is buried
- B. Excellent soil aeration
- C. Optimal moisture conditions
- D. Beneficial adaptation

70. What type of analysis uses a thin probe to measure wood density and detect decay?

- A. Visual assessment
- B. Sounding with a mallet
- C. Resistance drilling (resistograph)
- D. Increment boring only

71. According to the ANSI A300 standard, what is a reduction cut?

- A. Any cut that removes a branch
- B. A cut reducing branch length to a lateral at least 1/3 the diameter of the cut stem
- C. A cut flush with the trunk
- D. A cut leaving a stub

72. Trees under drought stress often exhibit what symptom first?

- A. Root rot
- B. Excessive flowering
- C. Bark splitting
- D. Wilting and/or leaf scorch

73. What is the primary benefit of maintaining species diversity in urban forests?

- A. Resilience against species-specific pests and diseases
- B. Uniform appearance
- C. Simplified maintenance
- D. Reduced costs

74. Which situation indicates that a tree should NOT be climbed until further assessment?

- A. Minor lichen growth on bark
- B. Small amount of deadwood in outer crown
- C. Evidence of severe basal decay with significant structural concern
- D. Previous pruning wounds that have closed

75. What is the purpose of the feed control bar on a wood chipper?

- A. To increase feed rate
- B. To stop or reverse the feed mechanism when pushed for operator safety
- C. To adjust chip size
- D. To control discharge direction

76. Symptoms appearing on the oldest leaves first typically indicate deficiency of which type of nutrient?

- A. Immobile nutrients
- B. Micronutrients only
- C. All nutrients equally
- D. Mobile nutrients that can be translocated from old to new growth

77. In tree appraisal, what does the location factor evaluate?

- A. The functional and aesthetic contribution of the tree based on its site
- B. Only the distance from buildings
- C. Soil quality at the planting site
- D. Climate zone appropriateness

78. What is the term for the practice of removing all branches back to the trunk or main scaffolds?

- A. Crown thinning
- B. Crown raising
- C. Pollarding or topping
- D. Crown cleaning

79. Which factor most affects wound closure rate on trees?

- A. The color of wound dressing applied
- B. The tree's annual growth rate and overall vigor
- C. The exact shape of the wound
- D. The compass direction the wound faces

80. What is the primary purpose of the heartwood in a living tree?

- A. Water conduction
- B. Nutrient storage
- C. Sugar transport
- D. Structural support only; it is no longer physiologically active

81. When conducting a basic tree risk assessment, the assessor should evaluate which zones around the tree?

- A. Above-ground tree structure, root zone, and surrounding target area
- B. Only the trunk condition
- C. Only the crown
- D. Only the area within the dripline

82. Horizontal cracks in tree trunks indicate what level of risk concern?

- A. Minor concern requiring only monitoring
- B. No significant concern
- C. High concern as they indicate structural failure may be imminent
- D. Moderate concern only if accompanied by decay

83. What is the purpose of air excavation when examining tree roots?

- A. To inject fertilizer into the root zone
- B. To remove soil without damaging roots for examination or treatment
- C. To water roots more efficiently
- D. To kill unwanted roots

84. The retention of dead leaves on a tree through winter is called what?

- A. Abscission
- B. Senescence
- C. Dormancy
- D. Marcescence

85. When is fertilization most likely to benefit an established landscape tree?

- A. When soil or tissue tests indicate specific nutrient deficiencies
- B. Every spring regardless of tree condition
- C. Immediately after major pruning
- D. During drought stress

86. What distinguishes a sign of tree disease from a symptom?

- A. Signs are always more serious than symptoms
- B. Symptoms appear first; signs appear later
- C. Signs are direct evidence of the causal agent; symptoms are plant responses
- D. There is no difference between signs and symptoms

87. Which rigging component is used to change the direction of rope travel?

- A. Sling
- B. Block or pulley
- C. Carabiner alone
- D. Choker

88. What is the proper sequence for developing an integrated pest management program?

- A. Apply pesticides first, then monitor for results
- B. Treat all potential pests preventively
- C. Eliminate all monitoring to reduce costs
- D. Monitor, identify pest, determine if action threshold is reached, select appropriate tactics

89. During what time of year is oak wilt most likely to be transmitted by beetle vectors?

- A. Spring and early summer when beetles are active and feeding on fresh wounds
- B. Late fall only
- C. Winter when trees are dormant
- D. Any time of year equally

90. Transplant shock in newly planted trees is primarily caused by what condition?

- A. Excessive root mass
- B. Immediate pathogen attack
- C. Imbalance between water demand (crown) and water supply (reduced root system)
- D. Genetic factors

91. What is the significance of visible root flare at the base of a tree trunk?

- A. It is purely aesthetic with no functional importance
- B. It indicates proper planting depth and healthy root-trunk transition
- C. It always indicates root problems
- D. It should be covered with soil for protection

92. The specific gravity of wood is most directly related to what wood property?

- A. Color
- B. Odor
- C. Sapwood percentage
- D. Density and strength

93. What type of assessment is conducted when a tree has been identified for potential climbing work?

- A. Pre-climb safety assessment evaluating hazards
- B. Post-work evaluation only
- C. Financial appraisal
- D. Inventory assessment

94. Which practice most effectively protects tree roots during construction?

- A. Informing the contractor verbally
- B. Marking trees with paint only
- C. Protective fencing at the critical root zone boundary installed before construction begins
- D. Watering after construction is complete

95. What is the purpose of establishing action thresholds in IPM programs?

- A. To maximize pesticide applications
- B. To determine when pest populations warrant intervention
- C. To eliminate all pest monitoring
- D. To schedule treatments on a calendar basis

96. A lightning protection system for trees must include air terminals, conductors, and what other essential component?

- A. Solar collectors
- B. Irrigation connections
- C. Insulated mounting hardware only
- D. Ground rods providing earth connection

97. What is the recommended frequency for inspecting support systems (cables and braces) installed in trees?

- A. At least annually and after major storms
- B. Only when problems are observed
- C. Every 10 years
- D. Monthly during growing season

98. Which pruning type specifically addresses hazard reduction by removing dead and weakly attached branches?

- A. Crown reduction
- B. Structural pruning
- C. Crown cleaning
- D. Crown thinning

99. The symbiotic relationship between leguminous plants and nitrogen-fixing bacteria occurs in what structures?

- A. Leaf stomata
- B. Root nodules
- C. Flower parts
- D. Bark lenticels

100. When evaluating tree risk, what does "likelihood of impact" assess?

- A. The probability the tree will be struck by lightning
- B. The severity of potential damage
- C. The structural condition of the tree
- D. The probability that if failure occurs, the failed part will strike the target

PRACTICE TEST 5: ANSWER KEY

WITH EXPLANATIONS

1. **A. Vascular cambium** - The vascular cambium is a thin cylindrical layer of meristematic cells that produces secondary xylem (wood) toward the inside and secondary phloem toward the outside. This lateral meristem is responsible for diameter growth in trees.
2. **D. To prevent bark tearing when the branch falls** - The first undercut (from below) prevents the bark from tearing down the trunk when the branch weight causes it to fall. Without the undercut, the falling branch strips bark from the trunk.
3. **B. Loam** - Loam is a balanced soil texture containing roughly equal proportions of sand, silt, and clay. This combination provides good drainage, adequate water retention, and reasonable nutrient-holding capacity ideal for tree growth.
4. **C. Compound leaves** - Compound leaves have multiple separate leaflets attached to a central axis (rachis). They may be pinnate (leaflets along the rachis) or palmate (leaflets radiating from a single point).
5. **D. The utility company must de-energize or protect the lines before work begins** - ANSI Z133 requires that when minimum approach distances cannot be maintained, work must stop until the utility de-energizes lines, installs protective covering, or provides appropriate supervision.
6. **A. Dead, dying, diseased, crowded, weakly attached, and broken branches** - Crown cleaning as defined by ANSI A300 selectively removes problematic branches including dead, dying, diseased, crowded, weakly attached, low-vigor, and broken branches.
7. **C. Soil porosity** - Soil porosity is the proportion of soil volume occupied by pore spaces, which can be filled with air or water. Adequate porosity is essential for root respiration and water movement.
8. **B. The barrier zone formed by new wood after wounding** - Wall 4 in the CODIT model is the barrier zone, formed by new wood laid down by the cambium after wounding. It is typically the strongest wall, separating wounded tissue from subsequent growth.
9. **A. Structural failure due to inadequate load-bearing capacity** - A thin shell of wood remaining around a large cavity may be insufficient to support the tree's weight and wind loads. Shell thickness relative to trunk radius is critical for structural assessment.

10. **D. Moving rope technique (MRT) or doubled rope technique (DRT)** - In MRT/DRT, the climbing rope passes over a tie-in point with both ends returning to the climber, who uses a friction hitch to ascend while the rope moves through the system.
11. **C. Transpirational pull and cohesion-tension** - Water movement in xylem is primarily driven by transpiration creating negative pressure (tension) in leaves, with cohesion between water molecules pulling continuous water columns upward from roots.
12. **B. 2 to 4 inches** - Mulch should be applied 2-4 inches deep. Shallower depths provide inadequate benefits; deeper applications can restrict oxygen, harbor pests, and promote stem-girdling root development.
13. **D. Alternate** - Alternate leaf arrangement has single leaves emerging at each node in a staggered pattern along the stem. This is the most common arrangement in temperate trees.
14. **A. Root and butt rot with significant decay** - Ganoderma species are aggressive decay fungi that cause root and butt rot. Shelf-like conks at the tree base indicate advanced decay affecting structural stability.
15. **C. After 1 to 2 growing seasons once roots establish** - Guy wires should be removed after roots establish (typically 1-2 years). Leaving them longer can cause trunk damage and prevent proper trunk development.
16. **B. Rigid direct support at the point of attachment** - Braces are rigid threaded rods installed through weak attachments to provide direct structural reinforcement at the point of weakness, unlike flexible cables that limit movement.
17. **D. Initiating lateral root development** - The pericycle is a layer of cells inside the root that retains meristematic capability and initiates lateral root formation. Branch roots originate from pericycle cell divisions.
18. **A. Abscisic acid** - Abscisic acid (ABA) inhibits growth, promotes stomatal closure during water stress, and induces dormancy in buds and seeds during unfavorable conditions. It is often called the "stress hormone."
19. **C. One foot of radius per inch of trunk diameter (DBH)** - The standard critical root zone calculation is 1 foot of radius for each inch of trunk diameter at breast height. A 20-inch DBH tree has a CRZ radius of 20 feet.
20. **B. Secondary pests attacking weakened trees** - Most bark beetles are secondary pests that successfully attack only stressed or weakened trees. They often introduce fungal pathogens (like blue stain fungi) during feeding.
21. **D. Leave the wound untreated to close naturally** - Research shows wound dressings do not prevent decay and may actually slow wound closure. Healthy trees close wounds most effectively when left untreated.

22. **A. Xylem vessels** - Vascular wilt pathogens colonize xylem vessels, blocking water transport and often producing toxins. This causes wilting symptoms that can progress rapidly through the crown.
23. **B. Likelihood of failure, likelihood of impacting target, and consequences** - Tree risk assessment evaluates these three components: probability of structural failure, probability the failed part strikes the target, and severity of harm if impact occurs.
24. **C. Periderm** - The periderm is the outer protective layer replacing the epidermis in woody plants. It consists of cork cambium (phellogen), cork cells (phellem), and phelloderm, forming the outer bark.
25. **D. Root loss affecting the corresponding crown section** - Roots on one side of a tree supply the corresponding crown section. When roots are damaged or lost, the crown above often shows dieback in a pattern matching the root loss.
26. **A. Mesophyll (palisade and spongy parenchyma)** - Photosynthesis occurs primarily in mesophyll tissue, which contains chloroplast-rich cells. Palisade mesophyll is densely packed for light capture; spongy mesophyll facilitates gas exchange.
27. **B. To prevent soil compaction and root damage** - Tree protection zones exclude equipment and activities that cause soil compaction and physical root damage, the two most common and serious construction impacts on trees.
28. **D. Chronic stress and decline** - Progressive symptoms over years (small leaves, short internodes, early fall color, sparse crown) characterize chronic decline from accumulated stresses rather than acute infection.
29. **C. Tree vigor at the time of wounding** - A tree's ability to compartmentalize depends primarily on its vigor when injured. Vigorous trees produce stronger chemical and physical barriers than stressed trees.
30. **A. Remove completely as they will not decompose** - Synthetic materials (including treated burlap and synthetic straps) do not decompose and will eventually girdle roots and trunk. They must be removed completely at planting.
31. **B. Oxygen availability and water infiltration** - Compaction reduces soil pore space, immediately limiting oxygen diffusion and water infiltration. Roots require oxygen for respiration; without it, they cannot function.
32. **D. Just outside the branch collar preserving the collar tissue** - Proper cuts preserve the branch collar, which contains specialized tissue for compartmentalization and wound closure. Flush cuts and stubs both impair wound response.
33. **C. Ectomycorrhizae form a sheath around roots without penetrating cell walls** - Ectomycorrhizal fungi form a visible mantle (sheath) around root tips and grow between cells (Hartig net) but do not penetrate cell walls. Endomycorrhizae penetrate cells.

34. **A. Multiple shoots developing from buds below the cut** - Heading cuts remove the terminal bud and its apical dominance, releasing multiple lateral buds to grow. These shoots develop from surface tissue with weak attachment.
35. **B. 25 percent** - Removing more than 25% of live crown from a mature tree causes excessive stress, depletes energy reserves, and often stimulates undesirable epicormic sprouting.
36. **D. Complete inventories document every tree while sample inventories use statistical sampling** - Complete inventories record every individual tree; sample inventories collect data from selected plots or transects and project findings statistically to the larger population.
37. **A. Iron or manganese** - Immobile nutrients like iron and manganese cannot be translocated from older tissue. When deficient, symptoms (interveinal chlorosis) appear on youngest leaves while older leaves retain their nutrients.
38. **C. Stop work immediately and contact the utility company** - Unexpected electrical hazards require immediate work stoppage. Never assume lines are de-energized or safe; contact the utility for guidance before proceeding.
39. **B. Circling and potentially girdling roots** - Container-grown trees held too long develop circling roots that continue circling after planting, potentially girdling the trunk or major roots and causing decline or death years later.
40. **D. Hazard tree** - A hazard tree has both structural defects (likelihood of failure) AND is located where failure could strike something of value (target). Without both elements, there is no risk regardless of tree condition.
41. **A. Primary growth (elongation of shoots and roots)** - Apical meristems at shoot and root tips produce primary growth through cell division and elongation, increasing the length of stems and roots.
42. **C. Frequent watering of the root ball, adjusting based on soil moisture and weather** - Water must be applied directly to the root ball, which can dry quickly even when surrounding soil is moist. Frequency depends on conditions.
43. **B. Severing roots close to the trunk affecting a large percentage of the root system** - Root damage severity depends on proximity to trunk (larger roots severed closer in) and percentage of root system affected. Damage within 3× trunk diameter is most serious.
44. **D. Rosaceae** - Fire blight, caused by the bacterium *Erwinia amylovora*, affects trees in the rose family including apple, pear, hawthorn, mountain ash, and serviceberry.
45. **A. The tree's health and structural condition** - The condition rating in the trunk formula method evaluates tree health (vigor, crown density, growth) and structure (defects, decay, form), reducing value for trees in poor condition.

46. **C. A tree with suspected extensive internal decay not visible externally** - Advanced assessment using specialized equipment (resistance drilling, sonic tomography) is needed when internal conditions cannot be determined visually.
47. **B. Live wood at least 4 inches in diameter with sound attachment** - Tie-in points must be live, healthy branches at least 4 inches diameter at the tie-in with sound attachment and no decay or defects.
48. **D. To identify hazards and determine how they will be controlled** - Job hazard analysis (job briefing) identifies specific hazards at the work site and establishes how each will be controlled or avoided.
49. **A. Cambium at wound margins** - Callus (woundwood) tissue is produced by the cambium around wound margins. It rolls over the wound surface gradually, closing the wound from the edges inward.
50. **C. Prevention combined with organic matter incorporation and vertical mulching** - Compaction is difficult to reverse. Prevention is most effective; where compaction exists, vertical mulching and organic matter incorporation provide some improvement.
51. **B. Species, genus, and family representation percentages** - The 10-20-30 rule recommends no more than 10% of any species, 20% of any genus, and 30% of any family in an urban forest to reduce vulnerability to species-specific threats.
52. **D. Guying** - Guying uses cables or straps running from the trunk to ground anchors, providing external support. It is commonly used for newly transplanted large trees or trees with compromised root systems.
53. **A. Reduction cuts to appropriate lateral branches** - Proper crown reduction uses reduction cuts to lateral branches at least one-third the diameter of the removed branch, maintaining natural form while reducing size.
54. **C. Closing stomata to reduce transpiration** - When water is limited, trees close stomata to reduce water loss through transpiration. This also reduces CO₂ uptake, limiting photosynthesis as a tradeoff.
55. **B. Cultural control** - Cultural control modifies the growing environment to make it less favorable for pests, including proper watering, mulching, plant selection, sanitation, and maintaining plant health.
56. **D. It indicates the top of the branch attachment and helps guide proper cut angle** - The branch bark ridge marks where branch and trunk tissues meet at the top of the attachment, indicating where the cut should begin and guiding the proper angle.
57. **A. 50 kV** - For voltages below 50 kV, the minimum approach distance is 10 feet. Above 50 kV, the distance increases by 4 inches for each additional 10 kV.

58. **C. To reduce density while maintaining the tree's form by removing branches at their origin** - Thinning cuts remove branches at their point of origin or to lateral branches, reducing crown density without changing tree form.
59. **B. What nutrients the tree has actually absorbed** - Foliar (tissue) analysis reveals nutrient concentrations within the plant, showing what has actually been taken up regardless of soil conditions or availability.
60. **D. Select a different tie-in point and retest** - If a tie-in point fails testing, do not use it. Select a different point and test it before committing weight. Never assume a questionable anchor is adequate.
61. **A. Prevention and maintaining plant health** - Plant health care emphasizes prevention and overall plant health rather than reacting to pest outbreaks. Healthy plants better resist and tolerate pest pressure.
62. **C. Basal wounds affecting the lower trunk are most serious for structural stability** - Basal wounds affect the structural foundation of the tree. Decay at the base can cause complete tree failure; wounds higher affect only portions of the crown.
63. **B. Secondary growth** - Secondary growth is the increase in girth (diameter) produced by lateral meristems (vascular cambium and cork cambium). Primary growth increases length.
64. **D. Beginning early when branches are small and corrections require minor cuts** - Early structural pruning addresses problems when branches are small, making small wounds that close quickly. Delaying until defects are large requires large, harmful cuts.
65. **A. Fungi** - Anthracnose diseases are caused by various fungal species that produce characteristic irregular brown lesions following leaf veins. Cool, wet spring conditions favor infection.
66. **C. Protecting the root meristem and lubricating passage through soil** - The root cap covers the delicate meristematic zone, protecting it from damage. It secretes mucilage that lubricates root movement through soil and is continuously replaced.
67. **B. Target** - The sidewalk is a target—a location where people (things of value) could be harmed if the tree part fails. Without targets, there is no risk regardless of defect severity.
68. **D. Pulled back several inches from the trunk (no trunk contact)** - Mulch should not contact the trunk. A several-inch gap prevents moisture retention against bark, which promotes decay and pest problems (volcano mulching damage).
69. **A. Tree was planted too deeply or trunk is buried** - Adventitious roots forming above the original root zone indicate the trunk is buried, either from deep planting, fill soil, or volcano mulching. This is a serious condition.

70. **C. Resistance drilling (resistograph)** - Resistance drilling uses a thin probe that measures resistance as it penetrates wood. Changes in resistance indicate density variations, revealing decay as zones of reduced resistance.
71. **B. A cut reducing branch length to a lateral at least 1/3 the diameter of the cut stem** - ANSI A300 defines reduction cuts as cuts to lateral branches large enough to assume terminal role (at least 1/3 diameter of removed branch).
72. **D. Wilting and/or leaf scorch** - Drought stress symptoms typically appear as wilting during the day, leaf scorch (marginal browning), and premature leaf drop as the tree cannot supply adequate water to foliage.
73. **A. Resilience against species-specific pests and diseases** - Diversity ensures no single pest or disease can devastate the entire urban forest. The losses of elms to Dutch elm disease and ash to EAB demonstrate this vulnerability.
74. **C. Evidence of severe basal decay with significant structural concern** - Severe basal decay compromises the tree's structural integrity. Such trees may not safely support a climber's weight and activities.
75. **B. To stop or reverse the feed mechanism when pushed for operator safety** - The feed control bar is a safety device that stops or reverses feed mechanism when pushed. If entanglement begins, pushing the bar can stop the feed.
76. **D. Mobile nutrients that can be translocated from old to new growth** - Mobile nutrients (nitrogen, phosphorus, potassium, magnesium) can be remobilized from older leaves to support new growth. When deficient, older leaves show symptoms first.
77. **A. The functional and aesthetic contribution of the tree based on its site** - Location rating evaluates how the tree's position affects its functional benefits (shade, energy savings, screening) and aesthetic contribution to the property.
78. **C. Pollarding or topping** - Pollarding is a traditional practice of repeated removal back to permanent scaffold branches. Topping is indiscriminate cutting without planned maintenance. Both involve removing all branches to stubs.
79. **B. The tree's annual growth rate and overall vigor** - Wound closure rate depends on how much new wood the tree produces annually. Vigorous, fast-growing trees close wounds faster than slow-growing or stressed trees.
80. **D. Structural support only; it is no longer physiologically active** - Heartwood is dead tissue that no longer conducts water or stores reserves. It provides structural support and contains extractives that resist decay.

81. **A. Above-ground tree structure, root zone, and surrounding target area** - Basic risk assessment evaluates the entire tree (crown, trunk, root zone) and the surrounding area where failure could impact targets.
82. **C. High concern as they indicate structural failure may be imminent** - Horizontal cracks indicate the trunk is splitting apart—structural failure in progress. This is among the most serious defects, suggesting imminent failure risk.
83. **B. To remove soil without damaging roots for examination or treatment** - Air excavation uses compressed air to remove soil without cutting roots, allowing examination of the root system, root collar, or careful work in root zones.
84. **D. Marcescence** - Marcescence is the retention of dead leaves through winter, common in species like American beech and some oaks. Leaves drop in spring when pushed off by new growth.
85. **A. When soil or tissue tests indicate specific nutrient deficiencies** - Fertilization benefits trees when actual deficiencies exist. Testing identifies whether nutrients are needed and which ones, avoiding unnecessary or harmful applications.
86. **C. Signs are direct evidence of the causal agent; symptoms are plant responses** - Signs are the pathogen or pest itself (fungal fruiting bodies, insects). Symptoms are changes in the plant (wilting, chlorosis) in response to problems.
87. **B. Block or pulley** - Blocks and pulleys redirect rope direction in rigging systems, allowing loads to be controlled from the ground and enabling mechanical advantage configurations.
88. **D. Monitor, identify pest, determine if action threshold is reached, select appropriate tactics** - IPM follows a systematic process: monitor pest populations, accurately identify the pest, determine if intervention is warranted, then select appropriate control tactics.
89. **A. Spring and early summer when beetles are active and feeding on fresh wounds** - Nitidulid beetles that spread oak wilt are most active in spring and early summer. They are attracted to fresh wounds and carry fungal spores between trees.
90. **C. Imbalance between water demand (crown) and water supply (reduced root system)** - Transplanting removes most of the root system while the crown remains unchanged. The reduced roots cannot supply adequate water to support the existing canopy.
91. **B. It indicates proper planting depth and healthy root-trunk transition** - Visible root flare indicates the tree is planted at correct depth with proper trunk-to-root transition. Absence of flare suggests the tree is planted too deeply.
92. **D. Density and strength** - Specific gravity measures wood density (weight relative to water). Higher specific gravity indicates denser, stronger wood with more cell wall material per unit volume.

93. **A. Pre-climb safety assessment evaluating hazards** - Before climbing, the tree must be assessed for hazards: structural defects, decay, dead branches, electrical hazards, wildlife, and other conditions that could endanger the climber.
94. **C. Protective fencing at the critical root zone boundary installed before construction begins** - Physical barriers installed before any construction activity are most effective. They prevent equipment entry and are visible reminders throughout the project.
95. **B. To determine when pest populations warrant intervention** - Action thresholds define pest levels at which treatment is justified based on potential damage. This prevents unnecessary treatment of minor problems.
96. **D. Ground rods providing earth connection** - Complete lightning protection requires air terminals (at tree top), conductors (carrying current down the tree), and ground rods (dissipating current into earth).
97. **A. At least annually and after major storms** - Support systems require annual inspection and inspection after significant storms. Assessment verifies hardware condition, tree growth, cable tension, and continued appropriateness.
98. **C. Crown cleaning** - Crown cleaning specifically removes dead, dying, diseased, weakly attached, and broken branches—the types most likely to fail and cause damage. It directly addresses hazard reduction.
99. **B. Root nodules** - Nitrogen-fixing bacteria (*Rhizobium* species) form symbiotic relationships with leguminous plants in specialized root structures called nodules, converting atmospheric nitrogen to plant-usable forms.
100. **D. The probability that if failure occurs, the failed part will strike the target** - Likelihood of impact evaluates target occupancy and position relative to potential failure direction. Even if a tree fails, the target may not be struck.