FULL-LENGTH PRACTICE TESTS

PRACTICE TEST 4 – 100 QUESTIONS

1. The meristematic tissue responsible for diameter growth in trees is located where?

A. At the root tips

B. In the vascular cambium

C. In the apical buds

D. Within the pith

2. What is the term for the area of bark that forms a raised ridge at the top of a branch attachment?

A. Branch collar

B. Callus tissue

C. Branch bark ridge

D. Included bark

3. Which element is required in the largest quantity by trees and is a major component of chlorophyll?

A. Phosphorus

B. Potassium

C. Calcium

D. Nitrogen

4. A tree exhibiting thin crown, small leaves, and progressive dieback over several years is most likely experiencing what condition?

A. Decline

B. Acute disease

C. Nutrient toxicity

D. Normal senescence

5. When using a chain saw, the area at the upper portion of the bar tip where contact can cause the bar to rotate rapidly toward the operator is called what?

A. The cutting zone

B. The safety zone

C. The kickback zone

D. The guide zone

6. Which pruning type as defined by ANSI A300 selectively removes branches to reduce crown density?

A. Crown cleaning

B. Crown thinning

C. Crown raising

D. Crown reduction

7. A soil pH of 4.5 would be classified as what?

A. Strongly acidic

B. Neutral

C. Slightly alkaline

D. Strongly alkaline

8. The CODIT model describes how trees respond to wounding through what process?

A. Regeneration of damaged tissue

B. Healing and repair of wounds

C. Production of new bark layers

D. Compartmentalization of decay

9. An arborist notices honey-colored mushrooms growing in clusters at the base of an oak tree in autumn. This sign most likely indicates infection by which organism?

A. Powdery mildew

B. Armillaria (honey fungus)

C. Anthracnose

D. Bacterial leaf scorch

10. What is the purpose of a cambium saver or friction saver in tree climbing?

A. To increase climbing speed

B. To reduce rope wear and protect the tree

C. To protect the bark and reduce rope friction

D. To provide additional fall protection

11. Translocation of sugars in phloem occurs from areas of high sugar concentration to areas of low concentration. What are these areas called?

A. Sources and sinks

B. Producers and consumers

C. Origins and destinations

D. Nodes and internodes

12. According to ANSI Z133, at what minimum distance from energized electrical conductors below 50 kV must an unqualified arborist remain?

A. 5 feet

B. 15 feet

C. 20 feet

D. 10 feet

13. A compound leaf with leaflets arranged on opposite sides of a central stalk (rachis) exhibits what type of arrangement?

A. Palmate

B. Bipinnate

C. Pinnate

D. Simple

14. Boring insects such as emerald ash borer cause damage to trees by feeding in what location?

A. The cambial region beneath the bark

B. The heartwood

C. The leaf tissue

D. The root tips

15. When staking a newly planted tree, how should the ties be attached?

A. Tightly to prevent all movement

B. Loosely to allow some trunk movement

C. At the top of the tree for maximum support

D. Using wire directly against the bark

16. A support rod installed through the union of codominant stems to provide direct reinforcement is called what?

A. A cable

B. A guy wire

C. A prop

D. A brace

17. What is the primary function of the Casparian strip in root endodermal cells?

A. Storing carbohydrates

B. Producing root hairs

C. Regulating water and mineral uptake into the vascular cylinder

D. Protecting against pathogen entry

18. Which plant hormone is primarily responsible for promoting cell division and delaying leaf senescence?

A. Cytokinin

B. Ethylene

C. Abscisic acid

D. Gibberellin

19. What tool is used to measure tree diameter at breast height (DBH)?

A. Clinometer

B. Increment borer

C. Hypsometer

D. Diameter tape or calipers

20. The layer of cells produced by the cork cambium that forms the outer bark is called what?

A. Phelloderm

B. Phellem (cork)

C. Phloem

D. Periderm

21. Which of the following represents proper placement of a final pruning cut?

A. Flush with the trunk to minimize wound size

B. Leaving a 2-inch stub to prevent decay entry

C. Just outside the branch collar at an angle away from the trunk

D. Through the branch bark ridge

22. Dutch elm disease is spread primarily by what vector?

A. Bark beetles

B. Root grafts only

C. Wind-blown spores

D. Contaminated pruning tools only

23. In tree risk assessment, what does the term "consequence" refer to?

A. The likelihood of tree failure

B. The species of tree being assessed

C. The condition of the tree structure

D. The severity of harm if failure occurs and strikes a target

24. What characteristic distinguishes sapwood from heartwood?

A. Sapwood is darker in color

B. Sapwood contains living cells and conducts water

C. Heartwood is located closer to the bark

D. Heartwood conducts water more efficiently

25. When should pruning of oak trees be avoided to reduce the risk of oak wilt transmission?

A. During spring and early summer when beetle vectors are active

B. Only during winter months

C. During late fall exclusively

D. Timing does not affect oak wilt risk

26. A tree appraisal results in a value of $15,000. The tree then suffers damage that reduces its condition rating by 50%. What is the approximate loss in value?

A. $3,750

B. $15,000

C. $7,500

D. $11,250

27. Which mycorrhizal type forms a visible sheath around the root and is common in oaks, pines, and birches?

A. Arbuscular mycorrhizae

B. Endomycorrhizae

C. Vesicular mycorrhizae

D. Ectomycorrhizae

28. During a job briefing, all of the following should be discussed EXCEPT:

A. Hazards present at the work site

B. Personal matters unrelated to the job

C. Emergency procedures

D. Individual responsibilities

29. What causes the formation of frost cracks in tree trunks?

A. Rapid temperature changes causing differential contraction

B. Internal decay weakening the wood

C. Wind loading during winter storms

D. Ice accumulation on branches

30. Which type of root system is characterized by a dominant central root growing vertically downward?

A. Fibrous root system

B. Lateral root system

C. Adventitious root system

D. Taproot system

31. When using a wood chipper, which body part is most at risk if loose clothing or climbing equipment is worn?

A. Eyes from flying debris

B. Ears from excessive noise

C. Entire body from entanglement in the feed mechanism

D. Hands from contact with discharge

32. What is the primary purpose of the cuticle on leaf surfaces?

A. Gas exchange

B. Reducing water loss

C. Capturing light for photosynthesis

D. Absorbing nutrients

33. Trees that lose their leaves annually in autumn are classified as what?

A. Deciduous

B. Evergreen

C. Marcescent

D. Semi-deciduous

34. Vertical mulching is a technique used to address what soil problem?

A. Excessive drainage

B. High soil pH

C. Nutrient toxicity

D. Compaction

35. A property owner asks about the benefits of trees for reducing energy costs. Which benefit should be emphasized?

A. Increased property taxes

B. Reduced need for lawn maintenance

C. Shade reducing cooling costs and windbreaks reducing heating costs

D. Elimination of all utility expenses

36. The process by which water vapor exits leaves through stomata is called what?

A. Respiration

B. Transpiration

C. Guttation

D. Evaporation

37. What is the correct sequence for the three-cut method of removing a large branch?

A. Final cut, back cut, undercut

B. Back cut, undercut, final cut

C. Undercut, back cut, final cut

D. Undercut, top cut, final cut

38. Which condition would most likely cause iron chlorosis in a tree?

A. High soil pH (alkaline conditions)

B. Low soil pH (acidic conditions)

C. Excessive soil moisture

D. High nitrogen fertilization

39. What is the recommended minimum width for a tree planting hole?

A. Equal to the root ball diameter

B. 1.5 times the root ball diameter

C. 2 to 3 times the root ball diameter

D. 4 to 5 times the root ball diameter

40. A climber using a doubled rope technique (DRT/MRT) ascends using what mechanism?

A. Fixed rope with mechanical ascenders only

B. Rope moving through a friction hitch as the climber advances

C. Static line anchored at the ground

D. Single rope with foot loops

41. White rot fungi are distinguished from brown rot fungi by their ability to decompose what?

A. Cellulose only

B. Lignin only

C. Both heartwood and sapwood equally

D. Both lignin and cellulose

42. The minimum Personal Protective Equipment required when working within the drop zone during tree felling includes what?

A. Hard hat, eye protection, hearing protection, and proper footwear

B. Gloves only

C. Hard hat only

D. No special equipment if standing at safe distance

43. What is the term for the portion of a rigging system that prevents the rope from being pulled back through a pulley or block?

A. The choker

B. The sling

C. The becket or rope grab

D. The friction device

44. Which of the following practices is most effective for conserving beneficial insects in IPM programs?

A. Broad-spectrum insecticide applications on a calendar schedule

B. Avoiding broad-spectrum pesticides and providing habitat diversity

C. Removing all groundcover vegetation

D. Treating at the first sign of any insect

45. What is the appropriate action when a tree being assessed for climbing has a large basal cavity?

A. Climb on the opposite side of the cavity

B. Proceed with caution if the tree appears otherwise healthy

C. Use the cavity as a handhold during ascent

D. Do not climb; assess structural integrity before any climbing

46. The optimum soil pH range for most landscape trees is what?

A. 6.0 to 7.0

B. 4.0 to 5.0

C. 8.0 to 9.0

D. 3.0 to 4.0

47. Which of the following is characteristic of a properly made reduction cut?

A. The cut is made to a lateral branch that is less than 1/4 the diameter of the removed branch

B. The remaining lateral is too small to assume terminal function

C. The remaining lateral branch is at least 1/3 the diameter of the cut branch

D. The cut stimulates vigorous epicormic sprouting

48. The symbiotic relationship between tree roots and beneficial fungi is called what?

A. Parasitism

B. Mycorrhizae

C. Pathogenesis

D. Saprophytism

49. Air excavation tools remove soil using what medium?

A. High-pressure water

B. Mechanical auger

C. Chemical dissolving agents

D. Compressed air

50. What is the primary cause of transplant shock in newly planted trees?

A. Loss of root mass during transplanting

B. Excessive sunlight

C. Too much water after planting

D. Immediate fertilizer application

51. A tree with multiple leaders of similar size arising from the same point, often with included bark, has what structural condition?

A. Proper scaffold branch development

B. Strong attachments

C. Codominant stems

D. Natural growth habit requiring no intervention

52. When conducting an aerial rescue of a suspended climber, what is the first priority?

A. Documenting the incident for insurance purposes

B. Ensuring rescuer safety while reaching the victim quickly

C. Lowering all equipment before approaching

D. Waiting for emergency services to arrive

53. What is the term for a tree inventory that documents every tree in a defined area?

A. Sample inventory

B. Canopy assessment

C. Random survey

D. Complete inventory

54. Guttation, the exudation of water droplets from leaf margins, occurs under what conditions?

A. When root pressure is high and transpiration is low

B. During hot, dry weather

C. When the tree is experiencing drought stress

D. Only in deciduous trees during autumn

55. Which statement correctly describes the location of most tree roots?

A. Roots primarily grow straight down to the water table

B. Roots are evenly distributed throughout the soil profile

C. Most roots are in the upper 12-18 inches of soil

D. Roots are concentrated directly beneath the trunk

56. The likelihood of tree failure is determined by evaluating what factors?

A. Target value only

B. Defect severity, species, size, and loading potential

C. Tree species and age only

D. Weather conditions at time of assessment only

57. What type of fertilizer releases nutrients slowly over an extended period?

A. Quick-release fertilizer

B. Liquid fertilizer

C. Foliar fertilizer

D. Slow-release or controlled-release fertilizer

58. When is the best time to prune most deciduous shade trees for routine maintenance?

A. During dormancy (late winter to early spring)

B. During spring growth flush

C. Immediately after leaf emergence

D. During fall before leaf drop

59. A tree ordinance that requires replacement planting when trees are removed is promoting what urban forestry goal?

A. Elimination of all tree maintenance

B. Reduction of the urban forest

C. No net loss of canopy

D. Increased development density

60. What is the function of companion cells in phloem tissue?

A. Water conduction

B. Supporting sieve tube elements in sugar transport

C. Producing defensive chemicals

D. Storing starch reserves

61. Chlorosis appearing on the youngest leaves while older leaves remain green indicates deficiency of what type of nutrient?

A. Mobile nutrients

B. Macronutrients exclusively

C. Secondary nutrients only

D. Immobile nutrients

62. When a tree produces heavy seed crops in response to stress, this is commonly called what?

A. Stress crop or mast year

B. Normal annual production

C. Nutrient excess response

D. Juvenile growth phase

63. What is the primary purpose of conducting a soil test before fertilizing trees?

A. To satisfy regulatory requirements

B. To increase fertilizer sales

C. To determine if fertilization is needed and what nutrients are deficient

D. To measure soil temperature

64. A horizontal crack in a tree trunk indicates what level of concern for failure?

A. Moderate concern requiring monitoring

B. Severe concern indicating imminent potential failure

C. No concern if the tree appears healthy otherwise

D. Minor concern requiring no action

65. Which rigging configuration creates the highest dynamic forces?

A. Lowering with a friction device at slow speed

B. Multiple small pieces removed sequentially

C. Speedline at low angle

D. Negative rigging with extended free fall

66. The vascular cambium produces what tissues?

A. Xylem to the inside and phloem to the outside

B. Bark to the outside and pith to the inside

C. Cork in all directions

D. Leaves and flowers

67. Which sign would indicate the presence of wood decay in a standing tree?

A. Chlorotic foliage in the crown

B. Reduced annual growth

C. Fungal conk or mushroom on the trunk

D. Small leaves throughout the crown

68. What is the recommended action if a tree has been improperly topped in the past?

A. Top it again to maintain the shape

B. Restoration pruning over several years to develop new structure

C. Remove the tree immediately

D. No action is possible once a tree has been topped

69. In the plant health care approach, what role does monitoring play?

A. It replaces all treatment activities

B. It is only necessary after treatments are applied

C. It is optional for experienced practitioners

D. It provides information to guide treatment decisions

70. What is the most appropriate first response to a tree exhibiting signs of decline?

A. Accurate diagnosis of the underlying cause

B. Immediate heavy fertilization

C. Aggressive pruning to stimulate growth

D. Pesticide application as a precaution

71. An arborist observes D-shaped exit holes and serpentine galleries under the bark of an ash tree. What pest is responsible?

A. Asian longhorned beetle

B. Bronze birch borer

C. Emerald ash borer

D. Bark beetle

72. What determines the safe working load limit of rigging equipment?

A. The age of the equipment

B. The breaking strength divided by an appropriate safety factor

C. The color coding on the equipment

D. The weight of the climber only

73. Reaction wood that forms on the upper side of leaning branches in hardwoods is called what?

A. Compression wood

B. Spring wood

C. Summer wood

D. Tension wood

74. What is the primary benefit of having a diverse species composition in an urban forest?

A. Reduced resilience to environmental stresses

B. Simplified maintenance requirements

C. Uniform appearance

D. Protection against catastrophic loss from species-specific pests

75. When roots are severed during construction, how should the cuts be made?

A. Torn by equipment for faster work

B. Left ragged to promote callus formation

C. Clean cuts with sharp tools

D. At an angle pointing away from the tree

76. What information does a tree inventory provide for urban forest management?

A. Only aesthetic ratings of individual trees

B. Data on tree species, size, condition, and location for planning

C. Information on wildlife only

D. Soil chemistry analysis

77. The process by which cells convert glucose into energy, consuming oxygen and releasing carbon dioxide, is called what?

A. Photosynthesis

B. Transpiration

C. Translocation

D. Cellular respiration

78. According to proper planting practice, where should the root flare be positioned when planting a tree?

A. At or slightly above the final soil grade

B. 2 inches below grade

C. 4 inches below grade

D. 6 inches above grade

79. Which factor most affects the rate of wound closure in trees?

A. The color of the bark

B. The shape of the wound

C. The tree's growth rate and vigor

D. The time of year the wound was created only

80. A tree assessment conducted using specialized equipment to evaluate internal condition is what level of assessment?

A. Limited visual assessment

B. Advanced assessment

C. Basic assessment

D. Preliminary assessment

81. What is the primary purpose of the branch collar?

A. Supporting bird nests

B. Directing water away from the branch

C. Storing carbohydrates

D. Containing specialized tissues for compartmentalization and wound closure

82. When should supplemental watering be discontinued for a newly transplanted tree?

A. After one week

B. After one year

C. After roots have established and the tree shows signs of independent growth (usually 1-3 years)

D. Never; trees always require supplemental water

83. Which type of pruning cut removes a branch back to a lateral branch that is large enough to assume the terminal role?

A. Heading cut

B. Stub cut

C. Reduction cut

D. Flush cut

84. Soil compaction most directly affects root health by reducing what?

A. Soil temperature

B. Oxygen availability for root respiration

C. Soil color

D. Soil mineral content

85. What is the most common mode of transmission for Dutch elm disease between adjacent trees?

A. Bark beetle vectors

B. Wind-blown spores

C. Contaminated soil

D. Root grafts

86. Trees that perform C3 photosynthesis are generally less efficient in hot, dry conditions because of what process?

A. Photorespiration

B. Fermentation

C. Nitrogen fixation

D. Mycorrhizal activity

87. When is a climber permitted to work without being secured by a climbing system according to ANSI Z133?

A. When working on small branches

B. When within arm's reach of the climbing system

C. When ascending the first 10 feet

D. Never while in the tree; must always be tied in

88. The presence of girdling roots at the trunk base is most reliably detected by what method?

A. Observing crown symptoms only

B. Root flare excavation

C. Leaf tissue analysis

D. Increment boring

89. What is the appropriate pruning response when a tree has suffered storm damage with torn branches?

A. Leave all damage to heal naturally

B. Apply wound dressing to all cuts

C. Make clean cuts to remove damaged tissue

D. Top the tree to prevent future damage

90. Which nutrient deficiency is most commonly associated with overall yellowing of older leaves first?

A. Nitrogen

B. Iron

C. Manganese

D. Calcium

91. A professional tree appraisal may be needed for which of the following purposes?

A. Routine pruning estimates

B. Pest identification

C. Insurance claims, legal disputes, or property damage

D. Species identification

92. What does the term "target" mean in tree risk assessment?

A. The goal of tree maintenance

B. A person, property, or object that could be struck if the tree or part fails

C. The defect being evaluated

D. The species being assessed

93. Which condition indicates that a tree has been planted too deeply?

A. Visible root flare at soil surface

B. Rapid establishment and growth

C. Excellent trunk taper

D. Trunk entering the ground like a telephone pole with no root flare visible

94. Proper pruning of a dead branch should result in what wound characteristic?

A. A wound contained by the branch collar with no trunk wood exposed

B. A flush cut with the trunk surface

C. A stub extending several inches from the trunk

D. Removal of the branch collar to eliminate dead tissue

95. When trees are exposed to prolonged flooding during the growing season, what is the primary cause of root death?

A. Mechanical damage from water movement

B. Excessive nutrient uptake

C. Oxygen deprivation (anoxia)

D. Cold temperature injury

96. What is the function of sieve tube elements in phloem?

A. Water conduction

B. Sugar transport from sources to sinks

C. Structural support

D. Hormone production

97. A limited visual assessment is most appropriate for what purpose?

A. Detailed evaluation of a single high-value tree

B. Determining the extent of internal decay

C. Evaluating trees for root defects

D. Initial screening of many trees to identify those needing detailed assessment

98. What characteristic of sandy soils makes them challenging for tree growth?

A. High water retention

B. High nutrient holding capacity

C. Poor drainage

D. Low water and nutrient holding capacity

99. In the context of integrated pest management, what is the purpose of establishing action thresholds?

A. To eliminate all pest monitoring

B. To mandate pesticide application at first pest detection

C. To determine when pest levels justify intervention

D. To maximize pesticide sales

100. The annual rings visible in a cross-section of a tree trunk are formed by what tissue?

A. Phloem

B. Xylem

C. Cork cambium

D. Pith

PRACTICE TEST 4: ANSWER KEY WITH EXPLANATIONS

1. **B. In the vascular cambium** - The vascular cambium is a thin layer of meristematic cells located between the bark and wood. It produces xylem (wood) to the inside and phloem to the outside, causing the trunk and branches to increase in diameter (secondary growth).
2. **C. Branch bark ridge** - The branch bark ridge is the raised area of bark at the top of a branch attachment where branch and trunk tissues meet. It helps identify the proper angle for pruning cuts and indicates where branch tissue ends.
3. **D. Nitrogen** - Nitrogen is required in the largest quantity of all mineral nutrients and is a key component of chlorophyll, amino acids, and proteins. It is the nutrient most commonly deficient in landscape trees.
4. **A. Decline** - Progressive symptoms developing over years (thin crown, small leaves, dieback) characterize tree decline, which results from accumulated stresses weakening the tree over time, as opposed to acute disease causing rapid symptoms.
5. **C. The kickback zone** - The kickback zone is the upper quadrant of the bar tip where contact with an object can cause the chain to grab and rotate the bar rapidly upward and back toward the operator, causing serious injury.
6. **B. Crown thinning** - Crown thinning selectively removes branches throughout the crown to reduce density, improve light penetration and air circulation, and reduce weight while maintaining the tree's natural form.
7. **A. Strongly acidic** - Soil pH of 4.5 is strongly acidic. The pH scale ranges from 0-14, with 7 being neutral. Most landscape trees prefer pH between 6.0-7.0. Strongly acidic soils can cause nutrient imbalances.
8. **D. Compartmentalization of decay** - CODIT (Compartmentalization of Decay in Trees) describes how trees create chemical and physical barriers (walls) to isolate wounded and infected tissue, preventing decay spread rather than healing wounds.
9. **B. Armillaria (honey fungus)** - Honey-colored mushrooms in clusters at tree bases in autumn are characteristic of Armillaria species, aggressive root rot fungi that can kill trees. White mycelial fans beneath bark confirm the diagnosis.

10. **C. To protect the bark and reduce rope friction** - Cambium savers or friction savers protect tree bark from rope abrasion during climbing and reduce friction on the climbing line, extending rope life and making climbing more efficient.

11. **A. Sources and sinks** - In phloem transport, sources are areas producing excess sugars (mature leaves) and sinks are areas using sugars (roots, fruits, growing points). Translocation moves sugars from sources to sinks via pressure flow.

12. **D. 10 feet** - ANSI Z133 requires unqualified arborists to maintain at least 10 feet from electrical conductors operating below 50 kV. This applies to all body parts, tools, and materials being handled.

13. **C. Pinnate** - Pinnate compound leaves have leaflets arranged on opposite sides of a central rachis (axis), like a feather. Examples include ash, walnut, and hickory. Palmate leaves have leaflets radiating from a single point.

14. **A. The cambial region beneath the bark** - Emerald ash borer and other cambial feeders lay eggs on bark, and larvae feed in the cambium and phloem beneath the bark, creating galleries that disrupt water and nutrient transport.

15. **B. Loosely to allow some trunk movement** - Stakes should allow trunk movement, which stimulates proper trunk development and taper. Rigid staking prevents natural response to wind, creating weak trunks that cannot support themselves.

16. **D. A brace** - Bracing uses rigid threaded rods installed through weak attachments (typically codominant stem unions) to provide direct structural reinforcement. Unlike cables, braces are rigid and positioned at the point of weakness.

17. **C. Regulating water and mineral uptake into the vascular cylinder** - The Casparian strip is a waxy band in endodermal cell walls that forces water and minerals to pass through cell membranes rather than between cells, allowing selective uptake.

18. **A. Cytokinin** - Cytokinins promote cell division (cytokinesis), delay leaf senescence, and stimulate shoot growth. They are produced primarily in root tips and transported upward in the xylem.

19. **D. Diameter tape or calipers** - Diameter tape (D-tape) is calibrated to convert circumference to diameter, while calipers measure diameter directly. DBH (diameter at breast height) is measured at 4.5 feet above ground.

20. **B. Phellem (cork)** - Phellem, commonly called cork, is the dead, protective outer layer produced by the cork cambium (phellogen). Cork cells are filled with suberin, making them waterproof and protective.

21. **C. Just outside the branch collar at an angle away from the trunk** - Proper cuts preserve the branch collar while removing branch tissue. The cut should begin outside the branch bark ridge and angle down and away from the trunk.

22. **A. Bark beetles** - Dutch elm disease is primarily spread by bark beetles (Scolytus and Hylurgopinus species) that carry fungal spores from infected trees to healthy ones. Root grafts also spread the disease between adjacent trees.

23. **D. The severity of harm if failure occurs and strikes a target** - Consequence in risk assessment evaluates what would happen if failure occurs and the target is struck—ranging from minor damage to serious injury or death.

24. **B. Sapwood contains living cells and conducts water** - Sapwood is the physiologically active outer wood containing living parenchyma cells that store reserves and functional xylem that conducts water. Heartwood is dead and no longer conducts.

25. **A. During spring and early summer when beetle vectors are active** - Oak wilt fungal spores are spread by sap-feeding beetles attracted to fresh wounds. Avoiding pruning during vector activity periods (typically April-July) reduces infection risk.

26. **C. $7,500** - If the original value was $15,000 and the condition rating is reduced by 50%, the loss equals 50% of the value, which is $7,500. The remaining value would be $7,500.

27. **D. Ectomycorrhizae** - Ectomycorrhizal fungi form a visible sheath (mantle) around root tips and grow between root cortex cells (Hartig net). They are common in temperate forest trees including oaks, pines, birches, and beeches.

28. **B. Personal matters unrelated to the job** - Job briefings should focus on work scope, hazards, emergency procedures, individual responsibilities, and communication protocols—not personal matters unrelated to safe job completion.

29. **A. Rapid temperature changes causing differential contraction** - Frost cracks form when cold temperatures cause outer wood to contract faster than warmer inner wood. The resulting tensile stress causes vertical splitting, typically on south/southwest exposures.

30. **D. Taproot system** - A taproot system has a dominant central root growing vertically downward with smaller lateral branches. While common in young trees and some species, most mature trees develop predominantly lateral root systems.

31. **C. Entire body from entanglement in the feed mechanism** - Chipper feed mechanisms can grab loose clothing, climbing equipment, or lanyards and pull workers into the cutting mechanism. This is among the most serious and often fatal tree care hazards.

32. **B. Reducing water loss** - The cuticle is a waxy layer covering leaf epidermal cells that reduces water loss through evaporation. It is produced by epidermal cells and varies in thickness among species.

33. **A. Deciduous** - Deciduous trees lose all their leaves annually, typically in autumn in temperate climates. This adaptation conserves water and energy during periods when photosynthesis is limited by cold or drought.

34. **D. Compaction** - Vertical mulching involves drilling holes into compacted soil and filling them with organic matter or porous material. This improves aeration, water infiltration, and provides channels for root growth in compacted areas.

35. **C. Shade reducing cooling costs and windbreaks reducing heating costs** - Trees reduce energy costs through summer shade (reducing air conditioning needs by 20-30%) and winter wind protection (reducing heating costs). This is a well-documented urban tree benefit.

36. **B. Transpiration** - Transpiration is the evaporative loss of water from leaves, primarily through stomata. It drives the transpiration stream, cools leaves, and is the primary mechanism moving water from roots to canopy.

37. **D. Undercut, top cut, final cut** - The three-cut method: (1) undercut partway through from below, (2) top cut from above further out to remove branch weight, (3) final cut just outside the branch collar. This prevents bark tearing.

38. **A. High soil pH (alkaline conditions)** - In alkaline soils (high pH), iron becomes chemically unavailable even when present in soil. Iron chlorosis is extremely common in alkaline soils, appearing as interveinal yellowing on new leaves.

39. **C. 2 to 3 times the root ball diameter** - Wide planting holes provide loosened soil for lateral root expansion. Research shows trees establish faster in wide, shallow holes than in narrow, deep holes.

40. **B. Rope moving through a friction hitch as the climber advances** - In doubled rope technique (DRT/MRT), the rope passes over a tie-in point and both ends return to the climber. The friction hitch grips when weighted and slides when manipulated.

41. **D. Both lignin and cellulose** - White rot fungi decompose both lignin and cellulose, leaving soft, white, stringy or spongy residue. Brown rot fungi decompose primarily cellulose, leaving brown, crumbly lignin.

42. **A. Hard hat, eye protection, hearing protection, and proper footwear** - Workers in the drop zone during felling must wear appropriate PPE to protect against struck-by hazards from falling material and debris.

43. **C. The becket or rope grab** - A becket is a fixed attachment point on a block where a rope end can be secured, preventing it from running through. Rope grabs serve similar purposes in some rigging configurations.

44. **B. Avoiding broad-spectrum pesticides and providing habitat diversity** - Conservation biological control preserves natural enemies by minimizing harmful pesticides and providing habitat (flowering plants, groundcovers) that supports beneficial insect populations.

45. **D. Do not climb; assess structural integrity before any climbing** - Large basal cavities compromise structural integrity. Before climbing, the tree must be thoroughly assessed to determine if it can safely support a climber's weight and activities.

46. **A. 6.0 to 7.0** - Most landscape trees grow best in slightly acidic to neutral soil (pH 6.0-7.0). This range provides optimal nutrient availability. Some species have specific preferences outside this range.

47. **C. The remaining lateral branch is at least 1/3 the diameter of the cut branch** - Proper reduction cuts remove to a lateral capable of assuming terminal role, requiring at least one-third the diameter of the removed branch. Smaller laterals cannot assume this function.

48. **B. Mycorrhizae** - Mycorrhizae ("fungus-roots") are symbiotic associations between beneficial fungi and plant roots. The fungi receive carbohydrates from the tree and provide enhanced water and mineral (especially phosphorus) absorption.

49. **D. Compressed air** - Air excavation tools (air spades, air knives) use compressed air to blow soil away from roots without cutting them. This allows root examination, root collar excavation, and trenching near trees without root damage.

50. **A. Loss of root mass during transplanting** - Transplant shock results primarily from the substantial root loss that occurs when trees are dug. The remaining root system cannot supply adequate water to the existing crown, causing stress.

51. **C. Codominant stems** - Codominant stems are multiple leaders of similar size with a shared point of origin. They often develop included bark at their union, creating a structural weakness prone to failure.

52. **B. Ensuring rescuer safety while reaching the victim quickly** - Aerial rescue requires balancing urgency (suspension trauma is time-critical) with rescuer safety. A rescuer who becomes a victim doubles the emergency.

53. **D. Complete inventory** - A complete inventory documents every individual tree in the defined area, providing comprehensive data for detailed management but requiring significant resources to complete.

54. **A. When root pressure is high and transpiration is low** - Guttation occurs when roots continue absorbing water while stomata are closed (typically at night). Positive root pressure forces water out through hydathodes at leaf margins.

55. **C. Most roots are in the upper 12-18 inches of soil** - Research consistently shows most tree roots grow in the upper soil layers where oxygen, moisture, and nutrients are available. Deep roots exist but represent a small fraction of the system.

56. **B. Defect severity, species, size, and loading potential** - Likelihood of failure considers the structural defect's severity, species characteristics, size of the tree or part, and loading factors (wind, ice, saturation) that could initiate failure.

57. **D. Slow-release or controlled-release fertilizer** - Slow-release fertilizers release nutrients gradually over weeks or months, reducing leaching losses, providing consistent nutrition, and minimizing burn risk.

58. **A. During dormancy (late winter to early spring)** - Dormant pruning allows wounds to begin closing with spring growth, minimizes stress on the tree, and avoids pest transmission periods. Structure is easily visible without leaves.

59. **C. No net loss of canopy** - Replacement requirements help maintain or increase urban canopy cover by ensuring trees removed for development are replaced, supporting the goal of no net loss or net gain of urban trees.

60. **B. Supporting sieve tube elements in sugar transport** - Companion cells are metabolically active cells associated with sieve tube elements in phloem. They provide energy and proteins that sieve tubes need for sugar transport.

61. **D. Immobile nutrients** - Immobile nutrients (iron, manganese, calcium, boron) cannot be translocated from older to younger tissues. When deficient, symptoms appear on youngest leaves because older leaves retain their nutrient content.

62. **A. Stress crop or mast year** - When trees experience stress, they often produce heavy seed or fruit crops (stress crops), apparently diverting resources to reproduction before potential death. This can be a warning sign of declining health.

63. **C. To determine if fertilization is needed and what nutrients are deficient** - Soil tests reveal nutrient levels, pH, and other factors that determine whether fertilization would benefit the tree and what specific nutrients, if any, should be applied.

64. **B. Severe concern indicating imminent potential failure** - Horizontal cracks through the trunk indicate structural failure in progress. They represent one of the most serious defects, suggesting the tree may fail at any time.

65. **D. Negative rigging with extended free fall** - Negative rigging (piece falling past the rigging point) with significant drop distance creates extreme dynamic loads when the rope catches the falling piece. Forces can multiply several times beyond static weight.

66. **A. Xylem to the inside and phloem to the outside** - The vascular cambium produces secondary xylem (wood) toward the center of the tree and secondary phloem toward the bark, adding to trunk and branch diameter each year.

67. **C. Fungal conk or mushroom on the trunk** - Fungal fruiting bodies (conks, brackets, mushrooms) on the trunk are direct evidence of internal decay. Their presence indicates the decay fungus has been established long enough to produce reproductive structures.

68. **B. Restoration pruning over several years to develop new structure** - Topped trees can sometimes be restored by selecting well-positioned sprouts to develop as new leaders and branches, reducing competing sprouts, and gradually rebuilding structure over multiple pruning cycles.

69. **D. It provides information to guide treatment decisions** - Monitoring is central to PHC/IPM, providing data on pest populations, plant health, and environmental conditions that inform whether, when, and how to intervene.

70. **A. Accurate diagnosis of the underlying cause** - Treatment without diagnosis often fails or worsens problems. Identifying the actual cause (which may involve multiple factors) enables appropriate targeted treatment.

71. **C. Emerald ash borer** - D-shaped exit holes (distinctive of Agrilus beetles) and serpentine galleries under bark are diagnostic signs of emerald ash borer. This invasive pest has devastated ash populations across North America.

72. **B. The breaking strength divided by an appropriate safety factor** - Working load limit (WLL) equals breaking strength divided by a safety factor (often 5:1 to 10:1 for life safety applications). This ensures equipment can handle loads with margin for dynamic forces and wear.

73. **D. Tension wood** - Tension wood forms on the upper side of leaning branches in hardwoods, pulling the branch upward. Compression wood forms on the lower side of leaning branches in conifers, pushing upward.

74. **A. Protection against catastrophic loss from species-specific pests** - Species diversity ensures no single pest or disease can devastate the entire urban forest. Monocultures are vulnerable to complete loss, as demonstrated by Dutch elm disease and emerald ash borer.

75. **C. Clean cuts with sharp tools** - When root cutting is unavoidable, clean cuts with sharp tools promote wound closure and reduce decay entry. Torn roots from equipment create jagged wounds that heal poorly and invite pathogens.

76. **B. Data on tree species, size, condition, and location for planning** - Tree inventories provide the baseline data needed for management planning, budgeting, work scheduling, risk management, and tracking urban forest changes over time.

77. **D. Cellular respiration** - Cellular respiration occurs in mitochondria, converting glucose and oxygen into ATP (energy), carbon dioxide, and water. This process powers all cellular activities and occurs continuously in living cells.

78. **A. At or slightly above the final soil grade** - The root flare should be visible at or slightly above grade after settling. Planting too deeply buries the flare, promoting bark decay, girdling roots, and trunk problems.

79. **C. The tree's growth rate and vigor** - Wound closure rate depends primarily on how much new wood the tree produces annually. Vigorous, fast-growing trees close wounds faster than stressed, slow-growing trees.

80. **B. Advanced assessment** - Advanced assessment uses specialized tools (resistance drills, sonic tomographs, aerial inspection) to evaluate conditions that cannot be determined through visual examination alone.

81. **D. Containing specialized tissues for compartmentalization and wound closure** - The branch collar contains tissues specialized for wound response. Proper cuts preserve the collar, enabling effective compartmentalization and callus formation.

82. **A. After roots have established and the tree shows signs of independent growth (usually 1-3 years)** - Supplemental watering continues until the tree establishes a root system capable of meeting its water needs independently, typically requiring 1-3 growing seasons depending on tree size and conditions.

83. **C. Reduction cut** - Reduction cuts remove a branch or stem back to a lateral large enough (at least 1/3 the diameter) to assume the terminal role. This maintains the tree's form while reducing size.

84. **B. Oxygen availability for root respiration** - Compaction reduces soil pore space, immediately limiting oxygen diffusion into soil. Roots require oxygen for respiration; without adequate oxygen, they cannot function and will die.

85. **D. Root grafts** - While bark beetles spread Dutch elm disease between separated trees, transmission between adjacent trees occurs primarily through root grafts that form between roots of nearby elms, allowing direct fungal spread.

86. **A. Photorespiration** - C3 plants (most trees) experience photorespiration in hot, dry conditions when rubisco binds oxygen instead of CO2, wasting energy. C4 plants have mechanisms to concentrate CO2 and avoid this inefficiency.

87. **B. When within arm's reach of the climbing system** - ANSI Z133 allows climbers to be untied only when within arm's reach of a secure anchor point or while entering/exiting at the base. Otherwise, climbers must be secured at all times.

88. **B. Root flare excavation** - Root flare excavation (removing soil from the trunk base) is the most reliable method to detect girdling roots, which may be buried and invisible from above.

89. **C. Make clean cuts to remove damaged tissue** - Storm-damaged branches with torn bark should be pruned with clean cuts that remove damaged tissue and create wounds the tree can compartmentalize effectively.

90. **A. Nitrogen** - Nitrogen is mobile in plants, so when deficient, the plant remobilizes nitrogen from older leaves to support new growth. This causes older leaves to yellow first while newer leaves remain green.

91. **C. Insurance claims, legal disputes, or property damage** - Professional tree appraisals establish defensible monetary values needed for insurance claims, legal proceedings, tax purposes, or damage compensation.

92. **B. A person, property, or object that could be struck if the tree or part fails** - A target in risk assessment is anything of value within the potential failure zone that could be harmed if the tree or part fails.

93. **D. Trunk entering the ground like a telephone pole with no root flare visible** - Trees planted too deeply lack visible root flare at the soil line. The trunk appears to go straight into the ground without the characteristic widening at the base.

94. **A. A wound contained by the branch collar with no trunk wood exposed** - Proper dead branch removal cuts just outside the branch collar (if still identifiable), leaving collar tissue to close the wound without exposing trunk wood.

95. **C. Oxygen deprivation (anoxia)** - Flooded soils become anaerobic as water displaces soil air. Without oxygen, roots cannot respire and will die within days during the growing season when metabolic demands are high.

96. **B. Sugar transport from sources to sinks** - Sieve tube elements are the primary conducting cells in phloem, forming continuous tubes that transport dissolved sugars from sources (mature leaves) to sinks (roots, fruits, growing points).

97. **D. Initial screening of many trees to identify those needing detailed assessment** - Limited visual assessment efficiently screens large tree populations to identify individuals with obvious defects requiring more detailed (basic or advanced) assessment.

98. **D. Low water and nutrient holding capacity** - Sandy soils have large pore spaces that drain rapidly, retaining little water. Their low surface area and few negative charges result in minimal nutrient retention (low CEC).

99. **C. To determine when pest levels justify intervention** - Action thresholds define the pest population or damage level at which treatment becomes necessary, preventing unnecessary treatments while ensuring intervention when needed.

100. **B. Xylem** - Annual rings are formed by xylem (wood) produced by the vascular cambium. Each ring typically represents one year's growth, with early wood (spring) appearing lighter and late wood (summer) appearing darker.