Station 1

1. (1 point) Which of the following structures would a perfect flower lack?
   A. Sepals B. Petals C. Stamens D. Carpels E. Either A or B F. Either C or D

2. (1 point) A flower with no calyx would be characterized by a lack of which structure?
   A. Sepals B. Petals C. Stamens D. Carpels E. Both A and B F. Both C and D

3. (1 point) Bark is defined as all tissue outside of which structure?
   A. Sapwood B. Vascular cambium C. Secondary Phloem D. Phelloderm E. Cork cambium

4. (4 points) Order the following structures in order of appearance from the center of the tree to the outside.

   A. Secondary phloem
   B. Heartwood
   C. Phelloderm
   D. Cork
   E. Vascular cambium
   F. Cork cambium
   G. Sapwood

5. (1 point) According to the ABCDE model for flower development, a flower lacking the D gene would be lacking in which of the following structures?
   A. Sepals B. Petals C. Stamens D. Carpels E. Ovules

6. (2 points) What is the name of the structure that controls what enters the vascular cylinder in the roots?

7. (1 point) The structure in the previous question is composed mostly of:
   A. Cellulose B. Amylose C. Amylopectin D. Suberin E. Hemicellulose

8. (1 point) Which of the following species on the 2024 National Tree List would not be expected to exhibit double fertilization during reproduction?
   A. Western Larch B. White Oak C. Honey Mesquite D. Saguaro E. Northern Catalpa

9. (4 points) Identify the name of every type of cell in the mature female gametophyte in an angiosperm and the quantity of each type.

10. (2 points) Which of the cells in the mature gametophyte has two nuclei? What is the name for the nuclei?

Station 2

11. (1 point) Darling-58 is the name of a transgenic variant of what tree species on the 2024 National Tree List? Answer with the common name.

12. (2 points) What disease was Darling-58 engineered to be resistant to?

13. (1 point) Darling-58 is transgenic. What does it mean for the variant to be transgenic?

14. (1 point) Only two native trees in North America produce caffeine. What is the scientific name of the only tree that is on the 2024 National Tree List that produces caffeine.

15. (2 points) What common pest species in North America is characterized by D shaped holes in ash trees?

16. (2 points) Which family of trees is most commonly affected by the disease caused by the oomycete Phytophthora ramorum?

17. (2 points) Black currant (more generally, *Ribes* spp.) production in the US was decreased heavily due to the removal of the plants to try prevent which fungal disease affecting white pines?

18. (1 point) Which of the following phytohormones is most likely responsible for witches' broom?
    A. Auxin B. Cytokinin C. Abscisic acid D. Brassinosteroids E. Jasmonic acid

19. (1 point) Which of the following molecules would most likely be responsible for apical dominance in trees?
    A. Zeatin B. Gibberellic acid C. Indole-3-acetic acid D. Abscisin II

20. (1 point) Which tree on the 2024 National Tree List is the preferred host of the spotted lanternfly? Answer with the scientific name of this tree.

Station 3

21. (1 point) What is the common name of this tree?

22. (1 point) What is the scientific name of this tree?

23. (1 point) There are four major divisions of gymnosperms. How many of these divisions are represented by at least one species on the 2024 National Tree List?

24. (1 point) Which of the following traits are common in the genus of this tree? (select all that apply)
A. Pulvini B. Flat needles C. Cones facing upwards D. Fascicles of 2-5 needles

25. (1 point) Which of the following are valid uses of this tree? (select all that apply)
A. Christmas trees B. Canoes C. Construction D. Paper

26. (1 point) How many distinct subspecies of this species are usually recognized?

27. (1 point) Is this tree a hardwood or softwood?
A. Hardwood B. Softwood C. Both D. Neither

28. (2 points) Why are hardwoods often known as porous woods? What cellular structure is responsible for this difference?

29. (1 point) Which of the following soils would you be most likely to find this tree in?
A. Acidic B. Basic C. Moist D. Sandy

Station 4

30. (1 point) What is the scientific name of the tree shown above?

31. (1 point) What is the IUCN classification for this species?

32. (1 point) Which of the following best describes the pollination of this species?
A. Aerophily B. Anemophily C. Hydrophily D. Entomophily E. Ornithophily

33. (1 point) Which state is this tree the state tree of?

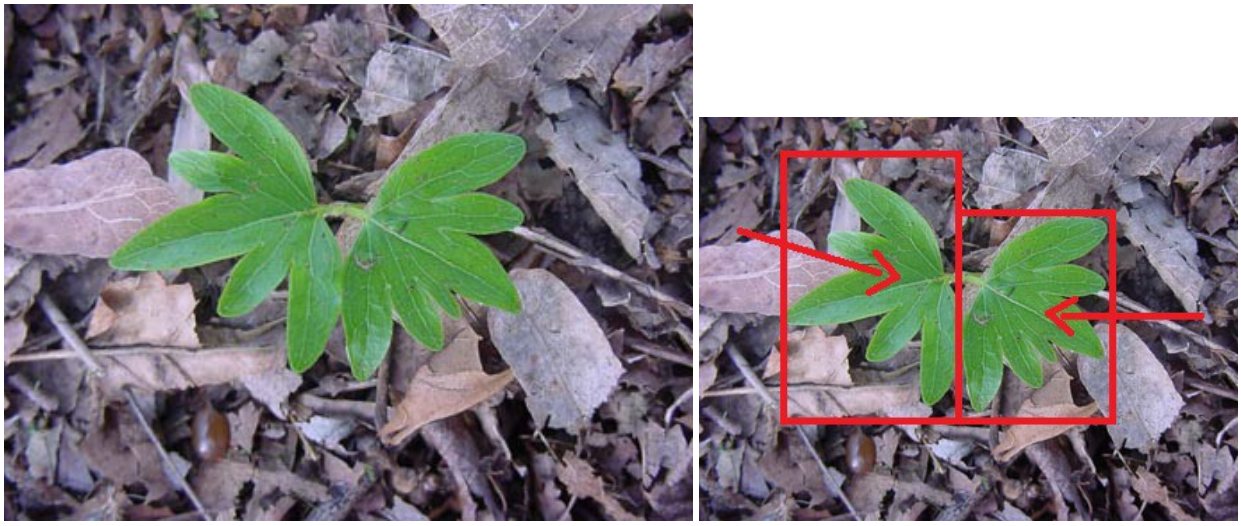
34. (1 point) Which of the following states would you not expect to find a natural specimen of this tree in? (select all that apply)
A. California B. Florida C. New York D. North Carolina E. Texas

35. (2 points) This tree's germination is hypogeal. What is the primary characteristic of hypogeal germination?

36. (1 point) The hypogeal germination of this tree implies that which part of the seedling would grow the most?
A. Hypocotyl B. Epicotyl C. Cotyledon D. Seed coat

37. (2 points) Would this plant grow in USDA hardiness zone 6? Why would it be able/inable to grow?

Station 5



Shown above: a tree seedling soon after germination

38. (2 points) Tiebreaker #1: What is the common name of this tree?

39. (1 point) What embryonic structure is being shown in the red rectangles? (it is not a leaf)

40. (1 point) Judging by the image, which of the following clades is this species most likely found within?
A. Monocot B. Eudicot C. Basal Angiosperms D. Magnoliids

41. (1 point) Traditional dicots are considered which type of taxonomic group?
A. Monophyletic B. Homophyletic C. Paraphyletic D. Polyphyletic

42. (1 point) Based on the image of the seedling, what type of germination does this exhibit?
A. Epigeal B. Hypogeal C. Parageal D. None of these

43. (1 point) Which of the following is true about the wood of this tree (select all that apply)?
A. Good tonewood B. Hard to work C. Citrus odor D. Furniture

44. (1 point) What type of inflorescence does this tree have?
A. Catkin B. Cyme C. Head D. Raceme E. Spike F. No flowers

45. (1 point) Which of the following best describes the flowers of this tree?
A. Hypogynous B. Perigynous C. Epigynous D. No flowers

Station 6

46. (1 point) What family is this tree in?

47. (1 point) The genus that this tree is in is usually subdivided into two groups. Which of the two groups (common or scientific name) is this tree a part of?

48. (1 point) What is the common name of this tree?

49. (1 point) Which of the following disperses the seeds of this species?
A. Birds B. Insects C. Water D. Wind

50. (1 point) Which of the following best describes the shade tolerance of this species?
A. Tolerant B. Intermediate C. Intolerant D. None of these

51. (1 point) Which of the following are uses of this tree's wood? (select all that apply)
A. Firewood B. Flooring C. Furniture D. Railroad Ties

52. (1 point) What US state is this tree the state tree of? If it is not the state tree of any state, write N/A.

53. (2 points) What is a tylose, and where can they be found? Include the type of cell that forms tyloses for full credit.

54. (2 points) What type of oak wood are tyloses most commonly found in? What property does this give to the wood of the tree that is useful for human use?

55. (1 point) Assuming this was a healthy tree, would you expect to see many tyloses in the wood of this tree?
A. Yes B. No C. Not enough information

Station 7

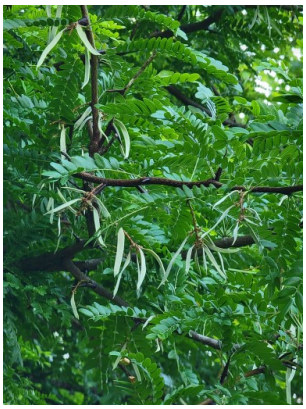


Image A

Image B

Image C

Image D

56. (1 point) Which of these trees is not in the same family as the others?
A. A B. B C. C D. D E. All are in the same family

57. (1 point) What family are the majority of these species in?

58. (2 points) What is the difference between complete flowers and incomplete flowers?

59. (1 point) Flowers in the family from #57 are usually:
A. Complete B. Imperfect C. Neither

60. (1 point) Which of the trees shown above has clusters of pink flowers?
A. A B. B C. C D. D E. None of these

61. (1 point) Which of the trees shown above has thornless cultivars that are used frequently as ornamental trees?
A. A B. B C. C D. D E. None of these

62. (1 point) Which of the trees shown above is a commercially important lumber tree?
A. A B. B C. C D. D E. None of these

63. (1 point) Which of the trees shown above has a green stem?
A. A B. B C. C D. D E. None of these

64. (2 points) What is the purpose of the green stem of the tree in #63? What environmental condition likely led to this trait?

65. (2 points) Would you expect the tree from #63 to conduct C3 or C4 photosynthesis? Why?

Station 8

66. (1 point) Which of these regions of the United States would you be most likely to find a tree of this species in?
    A. Great Plains B. Northeast C. Pacific Northwest D. Southeast E. Southwest

67. (1 point) What is the IUCN conservation status of this tree?

68. (1 point) What genus is this tree in?

69. (2 points) What does it mean for a cone to be sessile? Are the cones of this species sessile?

70. (2 points) What pest species currently threatens individuals of this species? What continent does this pest originate from?

71. (2 points) At what point in succession would you expect to see this species? What property of this species allows for the establishment at this stage?

Station 9

72. (1 point) Which of the following describe the leaves of this tree? (select all that apply)
    A. Alternate B. Opposite C. Whorled D. Simple E. Palmate F. Pinnate G. Bipinnate

73. (2 points) Which parts of this tree can you eat, what do you need to do to prepare it?

74. (1 point) What is the scientific name of this tree?

75. (2 points) This tree is polygamomonoecious. What does this term mean, and what types of flowers would you expect to see on an individual of this species?

76. (1 point) What USDA hardiness zones are this tree found in?

77. (3 points) What is the main symptom of leaf scorch? What is one way to prevent it from occurring?

Station 10

78. (1 point) What is the common name of this tree?
79. (1 point) What is the scientific name of this tree?
80. (2 points) This tree is sometimes described as monoecious. What does this mean, and why is this tree not really an example of one?
81. (2 points) What effect does fire have on trees of this species? How does this species recover after fires?
82. (2 points) 2, 4-D (2,4-Dichlorophenoxyacetic acid) is a synthetic form of what plant hormone? What impact would spraying it on a specimen of this tree have on the tree?
83. (1 point) Would you expect this species to exhibit double fertilization? Why?
84. (1 point) Fruits of this species are sometimes known as stone fruit. What is the botanical term for the type of fruit that this species exhibits?

Station 11

85. (1 point) What is the scientific name of this tree?

86. (1 point) How many US states is this tree the state tree of?

87. (2 points) What is the recommended harvesting method for this tree? In one sentence or less, describe this process.

88. (1 point) Which of the following best describes the shade tolerance of this species?
A. Tolerant B. Intermediate C. Intolerant D. None of these

89. (3 points) A forest is destroyed by a fire, and begins to regrow. What is this process of regeneration known as? Would you expect this species to regrow immediately after the fire, and why?

90. (2 points) If I planted this tree in a plot previously occupied by a mature black walnut, would you expect it to grow? Why? Assume that I plant the tree immediately after the black walnut was removed. (note: this question is repeated on purpose)

91. (1 point) Which of this tree's plant structures gives the tree the name "fiddle tree"?

92. (1 point) Which of the following are uses of this tree? (select all that apply)
A. Canoes B. Construction C. Dye D. Fruit production E. Honey F. Paper

Station 12

93. (1 point) What genus is this tree in?

94. (1 point) What is the common name of this tree?

95. (1 point) Addition of which nutrient is a contributor to the decline of the population in this species?
A. Aluminum B. Calcium C. Molybdenum D. Nitrogen

96. (1 point) What is the primary insect pest of this species?

97. (2 points) Drunken forests are most commonly composed of which species of spruce tree?

98. (2 points) What is the Kraft Process used for? Would you expect this tree to be used as an input to the process?

99. (1 point) Which of these states does this tree grow in natively? (select all that apply)
A. New Hampshire B. New York C. North Dakota D. Washington E. Wisconsin

100. (2 points) In one sentence or less, describe the first step of a typical shelterwood cutting process and its purpose.

Station 13

Image A

Image B

101. (1 point) Which of these trees would you expect to see with acorns?
A. A B. B C. Both D. Neither

102. (1 point) Which tree is a host that facilitates the reproduction of the microbe Phytophthora ramorum?
A. A B. B C. Both D. Neither

103. (1 point) Which tree is susceptible to the disease caused by Agrilus planipennis?
A. A B. B C. Both D. Neither

104. (1 point) Which tree is rated as Least Concern by IUCN?
A. A B. B C. Both D. Neither

105. (1 point) Which tree is commonly used for paper and pulpwood production?
A. A B. B C. Both D. Neither

106. (1 point) What is the scientific name of the tree in Image B?

107. (1 point) The leaves of tree B contain a toxic chemical that can cause methemoglobinemia. What is the name of this chemical?

108. (1 point) During the Great Depression, the wood from one of these trees was briefly used as a currency and legal tinder. Which image shows this tree, and what was the name for the currency?

Station 14

Image A

Image B

109. (1 point) Which family are these two trees in?

110. (1 point) Which of these trees is dioecious?
A. A B. B C. Both D. Neither

111. (1 point) Which of these trees has simple, opposite leaves?
A. A B. B C. Both D. Neither

112. (1 point) Which of these trees can be used for the rehabilitation of disturbed sites and environmental restoration?
A. A B. B C. Both D. Neither

113. (2 points) What is the origin of the scientific name of the tree in Image A?

114. (2 points) Cities will commonly plant only one sex of the tree in Image B. Which type is planted, and why?

115. (2 points) The tree in Image A is often used to extract heavy metal ions. Which ion does it usually extract? What is the name of this process of removal from the soil?

116. (2 points) What does DBH stand for? What does it measure?

117. (1 point) One of the trees in this family on the 2024 National Tree List is invasive in the United States. What is the scientific name of this tree?

Station 15

118. (1 point) What is the common name of this species?

119. (1 point) What is the name of the largest individual tree of this species?

120. (1 point) What is the name of the study and dating of annual tree rings?

121. (1 point) The growth of the width or thickness of the tree is known as:

122. (2 points) What two animals assist in the release of seeds for this tree? Answer with the common names.

123. (1 point) Which of the following is closest to the size of this tree's genome in bp?
A. $3 \cdot 10^6$ B. $8 \cdot 10^6$ C. $3 \cdot 10^9$ D. $8 \cdot 10^9$ E. $3 \cdot 10^{12}$ F. $8 \cdot 10^{12}$

124. (1 point) This tree is usually found in: (select all that apply)
A. Mixed stands B. Pure stands C. Diorite soils D. Granite soils E. Slate soils

125. (1 point) How many cotyledons does this species most often have have?

Station 16

Image A

Image B

126. (1 point) What family are these two trees part of?

127. (1 point) Which of these trees is also known as falcon berry?
A. A B. B C. Both D. Neither

128. (1 point) Which of these trees is used for erosion control?
A. A B. B C. Both D. Neither

129. (2 points) What are two properties of the tree that allow for this use as an erosion control mechanism? If you answered both for the preiovus question, you may answer with properties of either tree.

130. (2 points) Which United States city banned the collection of twigs from the tree in Image A? Why was it being picked so much?

131. (1 point) Both of these species have berries that are eaten commonly people. What type of ecosystem service is this?
A. Cultural B. Provisioning C. Regulating D. Supporting

132. (1 point) The largest city in Saskatchewan is named after one of these trees, and their local baseball team is also named after the same tree. Which of these trees was it?
A. A B. B C. Both D. Neither

133. (1 point) Which type of ecosystem service is provided by the previous example from #132?
A. Cultural B. Provisioning C. Regulating D. Supporting

Station 17

134. (2 points) What is the difference between a multiple fruit and aggregate fruit?

135. (1 point) What type of fruit is the shown fruit?
A. Aggregate B. Multiple C. Simple D. None of these

136. (1 point) What is the scientific name of this tree?

137. (1 point) The arrangement of leaves on the plant stem is more formally known as:

138. (1 point) Which of the following best describes the arrangement of the leaves of this tree?
A. Alternate B. Opposite C. Whorled D. None of the above

139. (1 point) Which of the following is a valid use of this tree? (select all that apply)
A. Bows B. Dye C. Fence posts D. Medicine for sore eyes E. Paper F. Soil enrichment

140. (1 point) This tree was used prominently during the Great Depression for what purpose?

141. (1 point) This tree sprouts vigorously from the stump. This makes this tree suitable for which type of woodland management?

Station 18

142. (1 point) What is the scientific name of this tree?

143. (1 point) Which of the following is a valid use of this tree's wood? (select all that apply)
A. Bows B. Doors C. Fence posts D. Furniture E. Tool handles

144. (1 point) What is the Janka Hardness of this tree in lb_f? You may round to the nearest 100 in your response

145. (3 points) What does the Janka Hardness represent in the most literal sense? Your answer should relate back to the test used to determine the Janka Hardness of a sample of wood.

146. (2 points) If I planted this tree in a plot previously occupied by a mature black walnut, would you expect it to grow? Why? Assume that I plant the tree immediately after the black walnut was removed. (note: this question is repeated on purpose)

147. (1 point) What is the ecological term for the transition zone between two communities?

148. (3 points) What is the region that serves as the boundary between land and rivers or streams known as? Would you expect to see a tree of this species in this area in a climax community, and why?

Station 19

149. (2 points) What is the primary difference between coppicing and pollarding?

150. (1 point) The plastochron measures the amount of time between what event under constant conditions?

151. (2 points) What are two ways in which trees reduce the Urban Heat Island effect?

152. (1 point) What is the difference between shelterwood cutting and seed tree cutting?

153. (2 points) What is the range of ages for trees in an even aged silvicultural system as a percent of the rotation age? Which method(s) in #152 aims to produces an even aged stand?

154. (1 point) What is one circumstance where a three step shelterwood cutting serves as a good method of generating trees?

155. (2 points) Group selection and individual tree selection differ in the types of trees they encourage the growth of. What can we expect to happen to the ratio of shade tolerant trees to shade intolerant trees after each management technique?

156. (1 point) In a forest, a very tall individual douglass fir tree reaches 10 meters above any other tree and recieves light from the top and sides. What crown class is this tree in?
A. Codominant B. Dominant C. Intermediate D. Subcanopy

157. (1 point) In the context of trees, what does CODIT stand for?

Station 20

Note: Answer with the common name for the first four images and and the scientific name for the last four images. Captions describe the image above them.

Image A

Image B

Image C

Image D

158. (1 point) What is the common name of the tree in Image A?

159. (1 point) What is the common name of the tree in Image B?

160. (1 point) What is the common name of the tree in Image C?

161. (1 point) What is the common name of the tree in Image D?

Image E

Image F

Image G

Image H

162. (1 point) What is the scientific name of the tree in Image E?

163. (1 point) What is the scientific name of the tree in Image F?

164. (1 point) What is the scientific name of the tree in Image G?

165. (1 point) What is the scientific name of the tree in Image H?