



Use these images for the next 13 questions.

1. (1 point) What family do all of these specimens belong to?

Moraceae

2. (1 point) Give the common and scientific name of A.

Solution: Maclura pomifera, Osage-orange

Thin leaf with pinnate venation and visible acuminate tip

3. (1 point) Give the common and scientific name of B.

Solution: Morus rubra, red mulberry

Dull and rough leaf surface and margins pointing towards the tip

4. (1 point) Give the common and scientific name of C.

Solution: Morus alba, white mulberry

Shiny leaf with more prominent veins than B

5. (1 point) Which of the images contains a species that is invasive to the United States.

C

6. (1 point) What is an invasive species?

Solution: A nonnative species

7. (4 points) Name two things which invasive plant species tend to have in common and explain how they would help an invasive species.

Solution: fast growth
rapid reproduction
high seed production and dispersal ability
tolerance of a wide range of environmental conditions
aggressive and prolific vegetative reproduction (massive root systems)
association with humans or human activities (land management practices).

8. (1 point) All of these specimens are dioecious. What does this mean?

Solution: Have separate male and female flowers on separate male and female individuals

9. (1 point) One of these species is also known as bois d'arc. Which specimen belongs to that species?

A

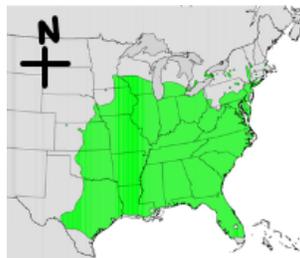
10. (1 point) Where does the name of bois d'arc come from?

Solution: The use of osage-orange in bows

11. (1 point) Knowing that these are dioecious trees, which of the following describes the flowers best?

- A. Incomplete, imperfect**
B. Complete, imperfect
C. Incomplete, perfect
D. Complete, perfect
E. Not enough information

12. (1 point) This range shows the native range of which of the specimens?



B

13. (1 point) You live in a city where the average annual minimum winter temperature is 2°F. What USDA hardiness zone do you live in, and which of the species can you plant in your city? Enter the hardiness zone (just give the integer, not a or b) in the first blank and the specimens that can be planted in the zone in the second blank.

9



Use this image for the next 11 questions.

14. (1 point) What is the scientific name of this species?

Larix occidentalis

Solution: Hairless twig with needles in large groups (>5) with a long sheath

15. (1 point) What phylum does this species belong in?

coniferophyta

16. (1 point) What is the IUCN conservation status of this species?

Solution: Least concern

17. (1 point) How is the pollen of this species distributed?

Wind

18. (1 point) This species is shade tolerant

A. True **B. False**

19. (1 point) During which months does this species' pollination occur?

Solution: June to July

20. (1 point) This species is a softwood. What is softwood?

Solution: Wood from a gymnosperm

21. (2 points) Using the internal structure of the wood, explain why wood from trees such as this are softer than trees from other trees such as balsa.

Solution: Vessel elements provide strength to the wood

22. (2 points) How is the Janka hardness rating determined?

Solution: The amount of force needed to embed an 11.28 mm steel ball halfway into a sample of wood.

23. (1 point) Is the Janka hardness rating higher or lower than 1000 lbf?

lower

24. (1 point) What is the Janka hardness rating of this tree? Answer with only the number, do not include the unit (lbf).

830



Use the images above for the next 16 questions.

25. (1 point) Which of these species is not in the same family as the others?

B

26. (1 point) What is the common name of this species?

American Elm

27. (1 point) What is the common family of the other three species?

Fagaceae

28. (1 point) What is the scientific name of A?

Quercus virginiana

Solution: 1cm Entire margins with midrib and edges lower than the lamina and acorn cap that is 1/3 of the length of the acorn

29. (1 point) What is the scientific name of B?

Ulmus americana

Solution: 1cm Asymmetrical leaf base and unforked leaf veins

30. (1 point) What is the scientific name of C?

Quercus chrysolepis

Solution: 1cm Alternate, glaucous leaves with pointed margins

31. (1 point) What is the scientific name of D?

Quercus prinus (or montana)

Solution: 1cm Crenate margin with margins that are rounded

32. (1 point) What is the leaf arrangement of specimen C?

Alternate

33. (2 points) Germination in specimen B is epigeal. What does epigeal mean?

Solution: Cotyledons are brought above the surface due to elongation of the hypocotyl

34. (2 points) What soil types can Specimen D grow in (use the USDA soil taxonomy)?

Solution: Ultisols and Inceptisols

35. (1 point) The USS Constitution was constructed from wood from which species?

A

36. (1 point) All 4 of these species have leaves that are:

- A. Simple
- B. Pinnately compound
- C. Palmately compound
- D. Bipinnately compound

37. (2 points) Define leaf area index (LAI).

Solution: The ratio of one sided leaf area to ground area

38. (1 point) If a mystery forest of 300 square kilometers has an LAI of .5, what is the leaf area? Answer with only the number. Do not include the unit (km²).

150

39. (1 point) Is the Janka hardness rating of specimen B higher or lower than 120?

Higher

40. (1 point) What is the Janka hardness rating of specimen B? Answer with only the number, do not include the unit (lbf).

830



Use the images above for the next 10 questions.

41. (1 point) What is the scientific name of A?

Quercus rubra

Solution: 1cm Wide leaf with pointed tips and 7 lobes

42. (1 point) What is the scientific name of B?

Quercus kelloggii

Solution: 1cm Lobes are 3 pointed with bristle tips (thin pointy protrusions) with pale bottom and shiny top

43. (2 points) Both of these species are part of a subgenus. What genus are they in, and what is the subgenus? Answer with the genus in the first blank and the subgenus in the second.

Quercus

44. (1 point) What is the defining characteristic of the subgenus?

Solution: Pointed leaves

45. (1 point) Specimen A is susceptible to infection from *Phytophthora ramorum*. What type of organism is *Phytophthora ramorum*?

Fungus

46. (1 point) What common tree disease does *Phytophthora ramorum* cause?

Sudden Oak Death

47. (1 point) Specimen A also has an ectomycorrhizal relationship. What does this mean?

Solution: Fungi wrap around outside of root cells

48. (2 points) What is the other general type of mycorrhizal relationship, and what is the difference between the two?

Solution: Endomycorrhizal, in which hyphae enter the cells

49. (1 point) What is the native range of specimen B?

Solution: California

50. (2 points) Older trees of the same species as specimen A provide a nesting site to a variety of animals. List two such species.

Solution: owls, various woodpeckers, tree squirrels, and American black bears

51. (3 points) Starting from the center of the tree, order the following layers of the tree from center to edge.

1. Heartwood
2. Vascular Cambium
3. Phelloderm
4. Sapwood
5. Periderm
6. Secondary Phloem
7. Cork Cambium

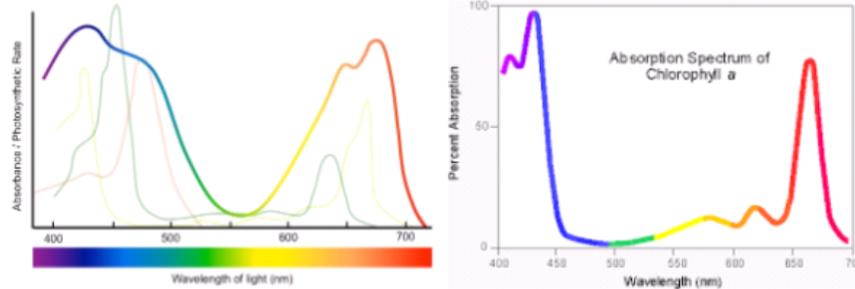
Solution: 1, 4, 2, 6, 3, 7, 5

52. (2 points) Botanically speaking, what is the bark? What layers of the tree are considered bark?

Solution: Everything external to the vascular cambium

53. (1 point) What is the name of the special pair of chlorophyll a molecules at the center of PSII?

P680



Use this image for the next 3 questions.

54. (1 point) What is an action spectrum?

Solution: A measure of the amount of photosynthesis by wavelength of light

55. (1 point) Using the action spectrum above, what is/are the optimal wavelength(s) for photosynthesis?

Solution: 425nm or 675nm

56. (2 points) Why are the action spectrum and absorption spectrum not the same?

Solution: The action spectrum accounts for multiple pigments, while the absorption spectrum is of only one pigment

57. (2 points) Relatively speaking, how does the pH of the thylakoid space compare to that of the stroma?

Solution: Thylakoid space is lower pH than stroma

58. (1 point) What is the term for the growth in thickness of the plant body?

Secondary Growth

59. (2 points) If we cover the tip of a seedling with a cap made of an opaque material and place it in a room with only a light source to the left, which direction would the seedling grow in? If the cap were made of a transparent material, how would the direction change?

Solution: Opaque - straight up, Transparent - to the left

60. (4 points) What are the three components of the triple response? What hormone is it triggered by?

**Solution: Slowed primary growth, increased secondary growth, and horizontal growth.
Ethylene**

61. (2 points) What is the difference between a totipotent cell and a pluripotent cell?

Solution: Totipotent cells can regenerate an entire organism, pluripotent cells cannot.



Use this image for the next six questions.

62. (1 point) Give the common name of the above tree species.

California Buckeye

Solution: 1cm Note spear-shaped inflorescence of white flowers with really long stamens

63. (1 point) This tree has both bisexual (perfect) flowers and staminate flowers on the same inflorescences. Where on the inflorescence are the perfect flowers?

Solution: On the tip (you could see the stigmas there)

64. (1 point) Where on the inflorescence will the fruits form?

Solution: On the tip (because that's where the stigmas are)

65. (2 points) This tree is not wind-pollinated. What about the pistils on the bisexual/perfect flowers might make it hard for this pollen carried by the wind to get into the style?

Solution: Not much sticky flat area on the tip of the style to collect pollen

66. (1 point) This tree species is primarily pollinated by butterflies and moths. What about them might make them be able to pollinate this tree's flowers?

Solution: large, flapping, wings, which could grab pollen from anthers and deposit it on stigma/style

67. (1 point) How many seeds does this plant usually have per seedpod?

Solution: usually one (accept 2 or 3)



Use these images for the next six (or more?) questions.

68. (1 point) Give the common name of the tree species in image A.

Red Maple

Solution: 1cm Lobes near the base of the leaf small when compared to Sugar and Silver maples. Serrations more frequent than in Sugar Maple and more irregular than in Silver Maple, but deeper than in Sweetgum or California Sycamore

69. (1 point) Give the common name of the tree species in image B.

Eastern Black Oak

Solution: 1cm Lobed and tips of lobes are pointy; leaf is really big and lightly lobed

70. (1 point) Give the common name of the tree species in image C

Red Pine

Solution: 1cm Pinkish bark, medium-sized leaves, smol cones

71. (1 point) Order them from least to greatest in how quickly their leaf litter decomposes.

Solution: CBA

72. (1 point) What is something in the leaves that could result in this difference?

Solution: lignin

73. (2 points) How might this difference in how easily the leaves decompose change how fire spreads?

Solution: If it's harder for the leaves to decompose, then there will be more leaf litter accumulated, so that might make it easier for fires to start/spread



74. (2 points) The photo above shows pre-settlement fire regimes in parts of the United States. Blue shows extremely-infrequent fires. Why might the green-circled region have extremely-infrequent fires?

Solution: It's in a floodplain so it's really wet

75. (2 points) There was a period of time with little to no fires in the recent past. Name three anthropogenic things which could have caused that.

Solution: Answers will vary. People putting out wildfires, roads fragmenting places, development, agriculture, etc.

76. (1 point) In some of the forests in the Eastern U.S. o' A (and prob other places), when you have more tree cover (more trees in a general area), fires are more likely to have a higher intensity (top-kill more trees). Why might that be?

Solution: More closely-packed trees, so it's easier for them to spread and get to the crown

77. (2 points) In many forests of the Eastern U.S. of A, fires are less frequent when there's more tree cover. Why might that be?

Solution: More shade makes less evaporation, so the ground area's wetter, so it's harder for fires to start and spread

78. (2 points) All this fire suppression has resulted in less frequent fires happening which in turn has resulted in even less frequent fires. Would you expect this to result in more shade-tolerant or shade-intolerant trees to start existing? How come?

Solution: More shade-tolerant trees because the bigger trees aren't getting top-killed as much, so there aren't that many openings for more shade-intolerant trees to grow into.

79. (1 point) Your friend Bald Shrudas says that this is "a viscous(vicious) cycle in a lot of places." What does he mean by that?

Solution: Less fire → more plants which make fire less likely → even less fire → etc.

80. (2 points) A lot of these shade-tolerant trees (like the American Beech) are known for having really dense canopies. How might that give an advantage to it? (a reason completely unrelated to fire)

Solution: Answers may vary; one answer might be shading out competition



81. (1 point) Give the common name of the tree species above.

American Basswood

Solution: 1cm Dark-colored, serrated, heart-shaped leaves; Also how the flower looks like



82. (1 point) Give the common name of the species in the above picture.

Kentucky Coffeetree

Solution: 1cm Compound pointy leaves; leaflets too wide (when compared to length) to be ailanthus/sumac/elderberry/walnuts/most ashes + flowers do not match them



83. (1 point) Give the scientific name of the tree species in the above image.

Fagus grandifolia

Solution: 1cm Smooth bark, unlobed leaves which look "bent" at vein-like areas (i have no idea how to describe this), deciduous



84. (1 point) Give the scientific name of the tree in the above image.

Sugar Pine

Solution: 1cm Clump-y, relatively-short needles, really long cones; branches looking like a single "unit" (almost like it being its own little christmas tree)



85. (1 point) Give the scientific name of the tree species in the above image.

Pinus lambertiana

Solution: 1cm Relatively orange-ish, "rugged" bark, short-medium needles, the branches feeling like their own "unit"



86. (1 point) Give the scientific name of the tree species in the above image.

Pinus ponderosa

Solution: 1cm Longer needles, small-mediumsized cones, location (you can see sagebrush in the background)



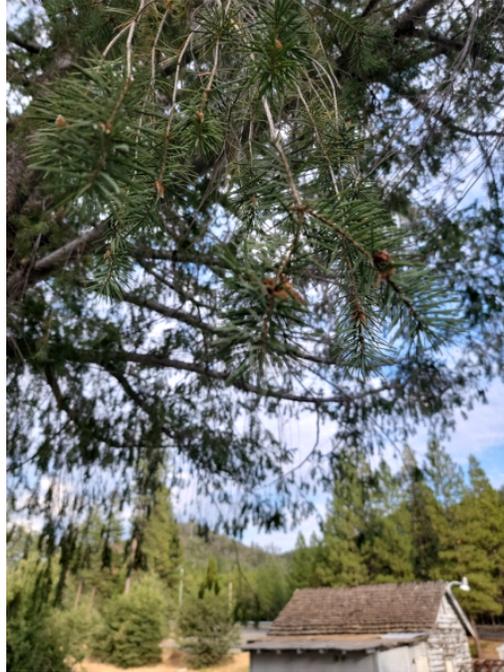
87. (1 point) Give the common name of the species in the above picture.

Sugar Pine

Solution: 1cm Tree shape's a big thing for this one, though it's kinda hard to describe here; You can see the comparatively short needles and the branch clump things (they all feeling like their own "unit")

88. (1 point) Fermi Question: How many leaves are there in all the trees in the world?

17



89. (1 point) Give the scientific name of the tree species in the image above.

Pseudotsuga menziesii

Solution: 1cm Pollen-cones not like spruce, no prominent pulvini, so probably not spruce, needle arrangement kinda "all over" so probably not fir

90. (1 point) What is your favorite tree (doesn't have to be on the National Tree List)?

Solution: Answers will vary

91. (7 points) Let's end with an open-ended long-response thing. This question will just be graded on a length requirement (≥ 7 sentences) and whether it express an opinion. Asking it here because it's probably worth thinking about. **Question: What's your opinion on logging/forest-management/fire management/other? Do you believe it should change? If so, how?** (There's a textbox below with some things to think about if you're stuck)

Solution: Answers will vary

Some things to think about if you're stuck:

- What do you feel makes a "healthy forest"?
- Is there a condition forests should "aspire towards"? Why or why not? If so, what?
- What commercial value do things in a forest bring? How does it vary with different forests?
- What other "value" do things in a forest bring? (old trees? coarse wooden debris? Other things?) How does that vary with different forests?
- Are there particular forests that should just be set aside? Why or why not? - What are the benefits of forests?
- etc.