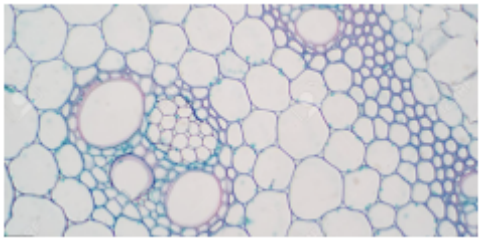
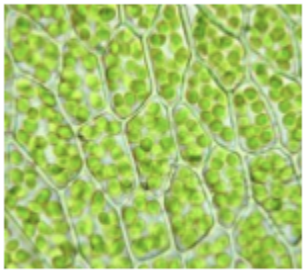
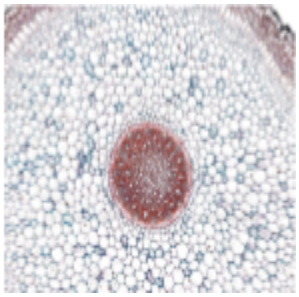
BirdSO Mini
Test Writer: Victoria Cheng

Answer Key

Structure and anatomy of Plants
Identify the following cells

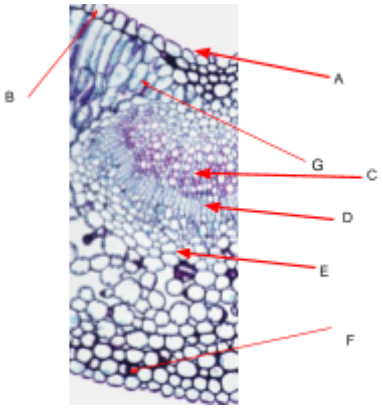






Stem cell	Leaf cell	Roots

1. Label the following cell



A. Cuticle	B. Epidermis	C. Xylem	D. Phloem	E. Spongy	F. Guard Cell/Stoma	G.Palisades

2. What is the importance of the function of stomates? On which part of the leaf are stomata mainly found (top or bottom), and what is the significance of having more stomata on that specific side.

Stomates are holes found at the bottom and top of the cell. They allow CO2 in and O2 and are opened and closed by guard cells. This gas exchange is important because it allows gas exchange without losing water vapor. The bottom of the leaf is cooler so it tends to hold more water.

3. When looking at a holly plant, you quickly take notice of the waxy texture lining the leaves. What is the importance of this texture? What is this secretion called?

The waxy texture is secreted by the epidermis. The epidermis protects leaves from diseases and dehydration. The rectangular structure allows it to fit together tightly so things are unable to pass between the cells. They secrete the cuticle which is made of lipids and are nonpolar, allowing it to seal the cell so no water can go through. Holly plants typically have a thicker cuticle. This allows them to survive harsher winters.

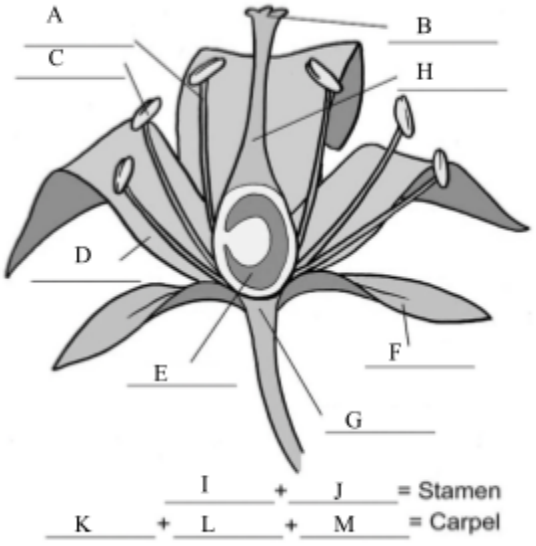
4. How does the structure and positioning of the spongy attribute contribute to the efficiency of photosynthesis?

The spongy is under the epidermis but still maximizes light absorption because it provides chloroplasts near the stomata. This is important because CO2 enters through the stomata so it would be more easier to circulate and get to all the cells that are photosynthetic.

5. Why is it important that the light reactions occur before the calvin cycle?

The calvin cycle is unable to proceed without ATP and NADPH2 which are found in the light dependent reactions

6. Label the flower



A. filament
B. stigma
C. anther
D. petal
E. ovary
F. sepal
G. receptacle
H. style
I. filament/anther
J. anther/filament
K. stigma/style/ovary
L. style/stigma/ovary
M. ovary/style/stigma

7. What is the difference between basifixed, subasifixed, and diversified attachment? What are the pros and cons of each attachment?

Basifixed- anther is attached to the filament by the base subasifixed- back of the anther near the base diversified- Filament is connected to the center back to the anther (I think I meant to type dorsified) The attachments determine how freely anthers can move during pollination.

8. Pollen grains contains two types of cells. _____ cells are produced before pollen leaves the anther. _____ cells are produced after pistil pollination.

Generative, vegetative

9. There are two categories of fruits: Aggregate fruits and Multiple fruits How are multiple fruits formed? What is an example of a multiple fruit?

An aggregate fruit develops from many ovaries from one single flower Multiple fruits are a cluster of flowers that form into one fruit: jackfruit, pineapple, fig

10. Plants with both reproductive organs are called _____. Plants with only male or female parts are called _____ and have _____ flowers.

Monoecious, dioecious, 4

11. How does the plant cycle demonstrate an alternation of generations? Which stages do they typically alternate between? Why is this alternation so important for plant genetic diversity?

An alternation of generations is when organisms alternate between sexual and asexual phases (also accept diploid sporophyte and haploid gametophyte). During the diploid sporophyte generation, plants produce spores. During the haploid gametophyte generation, plants produce gametes. This typically occurs when sporophytes mature. Alternation is important for maintaining genetic diversity because it has both haploid and diploid organisms. Additionally, sexual reproduction allows for there to be more genetic possibilities and crossing over to occur in genes.

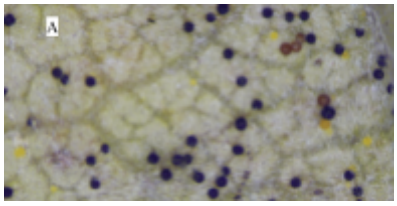
12. Microspore mother cells go through ____
    a. Meiosis
    b. Mitosis
    c. Birth
    d. Pollination
13. Haploid microspores go through
    a. Meiosis
    b. Mitosis
    c. Birth
    d. Pollination
14. What are the six basic parts of a plant?

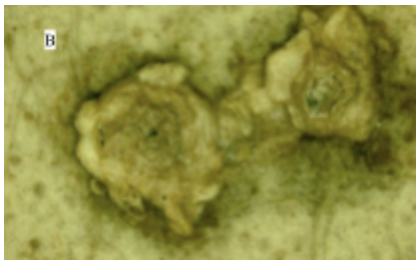
flowers, fruit, seeds, roots, stems, leaves

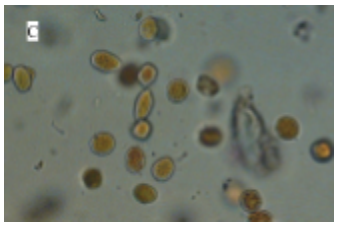
15. Describe the difference between taproot systems and fibrous root systems (Talk about how the environment they thrive in could have an impact on their overall structure).

Tap root systems are plants that have one main root with a few smaller roots poking out of it. They typically grow vertically and can live in denser, more moist soils. Fibrous root systems have a network of roots that typically grow horizontally in soil. They typically grow in more dry areas and are able to hold the soil together to prevent ersoion.

Identify the following diseases







Powdery Mildew	Citrus canker	Stripe rust

16. How is disease A typically spread (identify the vector if there is one)? Which climate does it thrive best in?

high humidity, moderate temperature woolly aphids

17. Name four plants Disease A affects.

Wheat, barely, legumes, grapes, onions, apples, pears, gourds, melons, lilacs, strawberries, trees, grapes

18. How can you genetically modify a plant to develop genetic resistance against Disease A?

Target mutations using CRISPR and TALENS; breed plants with the Pm3 allele

19. How is disease B typically spread (identify the vector if there is one)? Which climate does it thrive best in?

Tropical, subtropical Wind, storms, contamination

20. How would you typically identify Disease B with a microscope?

bumps on leaves, black outline

21. Where does Disease B typically affect? How is it entered inside the plant?

stomata or leaf wounds, fruit and leaves

22. Which plants does Disease C typically affect?

wheat and barely

23. Which genes in plants are resistant to Disease C?

Yr, Yr1, Yr24

Overwatered/Rotting roots	Burnt succulent

24. How would you treat plant A?

Identify the rot early, remove the head from the roots and propogate the succulent.

25. How would you treat plant B?

Move the plant into a less brightly lit area, water more

26. Cells that carry water are ____ cells. Cells that carry food are ____- cells.

Xylem, pholem

27. Why is it beneficial for plants with flowers to have soft and bendable bodies?

prevent from harsh weather, flexibility, transport nutrients

28. What is the function of alkaloids in nectar (discuss how its chemical structure help perform this function).

Alkaloids add a protection aspect from animals that aren't pollinators.

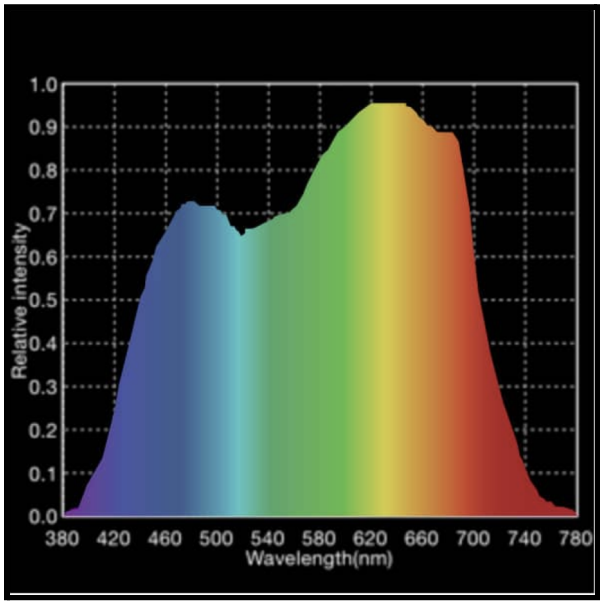
29. Why is it important that the secondary cell walls of heart wood are composed of cellulose and lignin (think structure, function).

Heart wood is basically wood that has gone through a chemical transformation to prevent the tree from decaying. Cellulose and lignin help with the structure of heartwood.

30. Which fruits are formed from the aril?
    a. Mangosteen
    b. Pineapple
    c. Apple
    d. Strawberry
    e. Plums

Photosynthesis

This graph is used for the next two questions.



31. What does the graph say about photosynthesis?

The colors absorbed by most chlorophyll types range from all the color spectrums. Since green is least absorbed, most plants reflect green (accept answers from blue, red, yellow, orange).

32. How does this graph explain the size and growth of red, blue, or purple colored plants?

Red, blue, and purple plants reflect red, blue, and purple light which means they typically absorb green, yellow, and orange light which means they are typically more short and stubby.

33. In photosynthesis, energy is transformed from _____ into _____ energy. The energy absorbed ____ electrons of _____ and the energy is stored in the _____ of sugar.

Light, chemical, excites, bonds

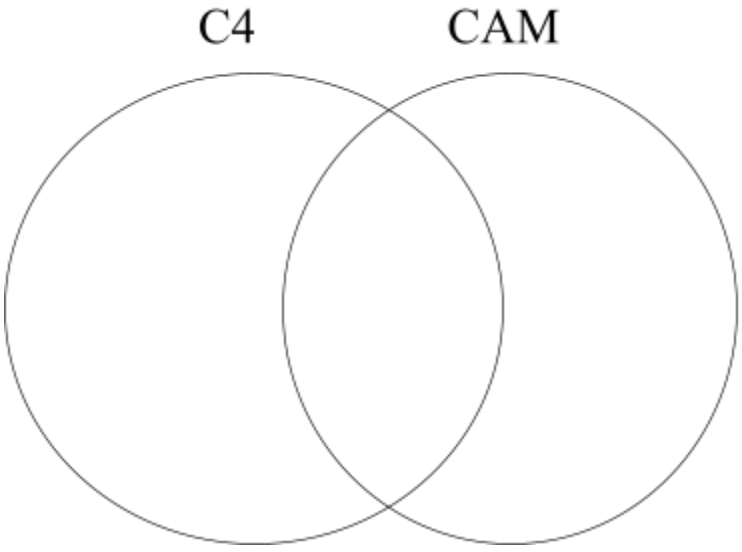
34. How is photosynthesis a series of redox reactions? Explain one specific example of a redox reaction that occurs.

Almost all stages in photosynthesis involve a redox reaction. Take answers that explain: reduce CO2 oxidize glucose, light dependent reactions, calvin cycle, NADP --> NADPH, Chemiosmosis

35. Why can't the calvin cycle occur during the night?

Light reactions are required for ATP and NADP

36. Venn Diagram
    a. Sugar cane
    b. Succulents
    c. 4 carbon product
    d. Pepco isn't inhibited by oxygen
    e. Bundle sheath is required to release CO2
    f. Stomates remain open at night
    g. CO2 binds to an organic acid that helps store CO2
    h. Dry climates



C4: A. Sugar cane C. 4 carbon product D. Pepco E. bundle sheath CAM: B. succulents F. Stomates open at night G. CO_2 binds to an organic acid to store CO_2 both: Dry climates

37. JC currently has a succulent that is starting to etiolate. What color light spectrum would he use so that his succulent maintains its stout size.

red/blue

38. What color light activates phytochrome? Why?

Red light, because it wakes up the plant.

39. Chlorophyll B has a methyl group which makes it more polar than chlorophyll a

True

40. Chlorophyll A absorbs energy from green wavelengths

True

41. When there is less light, chlorophyll B will be produced more than chlorophyll a. Why do you think that is the case?

Chlorophyll b accepts more wavelengths of light than chlorophyll a

42. Does photosynthesis represent a positive or negative feedback loop? Explain which process demonstrates the positive and/or negative feedback loop. (One paragraph)

Negative feedback loop --> plants store carbon dioxide this speeds up photosynthesis by increase carbon dioxide.

Plant Diversity:

43. List and describe two arguments for and two against genetically modified crops? (Describe the scientific, ethical, economic, and political issues) (One paragraph)

NOTE: all plants you eat have been genetically modified. reduce the use of pesticides and herbicides. GM foods can also decrease irrigation, deforestation, and land conversion increase food production create the "perfect" crop multinational corporations are using GMO foods to harm small farmers. This is because a lot of the research that is used to fund GMO research is by the bigger corporations. organic foods will be contaminated by GM foods. Some people also see GMO

foods as dangerous because they don't understand how GMO foods are created.

44. What is the value, to a species, of having genetic diversity? Next, list and describe three potential consequences of biodiversity loss for society. (One paragraph)

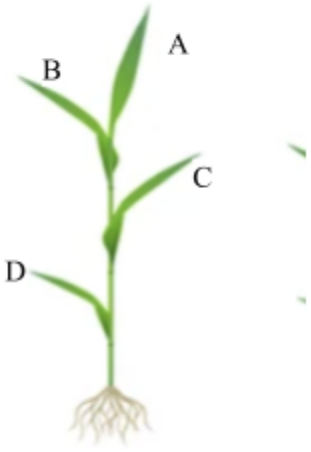
Biodiversity in the food we eat is really important for ensuring that there is food for future generations. If a disease comes that wipes out a certain crop, we have seed banks that preserve seed types to use if something were to happen. If we did not have these seed banks, there wouldn't be food for society. Without certain species,water quality could decrease and the overall health of the planet will be affected. If countries that rely on tourism and recreation lose their biodiversity, their economy could collapse.

Plant Growth

45. Explain what a prescribed burn is in a forestry context. Provide an example of how they can be beneficial for sustainable forestry management. Give an example of how fire can be an important natural component of a forest ecosystem. (One paragraph)

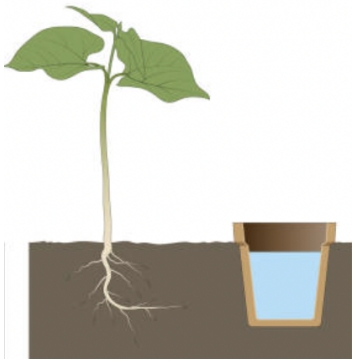
Prescribed burns are when humans intentionally set fires to help forests. Some reasons forestry management might prescribe fires include destroying invasive species and helping the ecosystem progress. It is also a tactic to mimic natural disturbances. Naturally, wildfires do occur and they are important for allowing space for younger trees to sprout and grow properly with the ashes and organic material of older trees. It is important to destroy invasive species and restore natural woodlands because invasive species prevent the growth of natural species through competition.

46. Where is the youngest leaf in the following wheat plant?



A

47. What type of growth does each plant demonstrate?


phototropism	gravotropism/geotropism	hydrotropism	thigmotropism

48. What are some factors that could affect PGR levels?

Time, moisture, light, depth, time, age

49. State whether the following features are monocot or dicot
    a. One cotyledon vein (monocot)
    b. Number of petals are divisible by four (monocot)
    c. Stems are formed into a ring (monocot)
    d. Angiosperms (monocot)
    e. Roots are fibrous (dicot)
    f. Veins are parallel (monocot)
50. Why is it important that we understand the root systems of monocot and dicot plants when it comes to fertilizers?

Different fertilizers target different root types.

51. Why are the stomata only on the bottom of leaves in dicot plants?

Dicot leaves are flat and receive a lot of sun so to prevent evaporation stomates are only found on the bottom of the leaves

52. State whether the following features are embryophyte or cryptograms
    a. Moss (embryophyte)
    b. Algae (cryptograms)
    c. Spores (cryptograms)
    d. Sporophyte are found inside gametophytes (cryptograms)
    e. Thallophytes (embryophyte)
53. How can growth rings differ depending on the environment's seasons?

harsher seasons = smaller rings favorable seasons = bigger rings

54. Why might the cell walls of wood be composed of more cellulose than leaves?

cellulose = stronger

55. How do you calculate the specific gravity of wood?

W = W(1+M/100) OR float wood in water

56. What happens to density as wood shrinks?

Increases

57. Conifers are typically
    a. Softwood
    b. Hardwood
    c. Engineered wood
58. Balsa is a
    a. Softwood
    b. Hardwood
    c. Engineered wood
59. _____ and _____ strength are dependent on the sound wood.

Stiffness, elasti

60. How does the cell structure of the phloem allow it to transport sugars?

sieve tube membranes; lots of pores

61. Why does the evaporation of water help the xylem pull water from the roots?

mention of water quality; transpiration causes a negative pressure which pulls water

62. What are the three goals of plant taxonomy?

identify, classify, describe

63. Which part of the dandelion is edible?
    a. Leaves
    b. Flower
    c. Stems
    d. Roots
    e. All of the above

Genetics

64. Define diploid, hexaploid, and tetraploid. Provide a plant for each of the examples

diploid- 2n wheat, flowers hexaploid- 6n wheat tetraploid- 4n potato

65. Chloroplasts contain DNA
    a. True
    b. False
66. Describe heteroduplexity and how it can be useful when identifying plants with resistance?

heteroduplexity is when the DNA forms these arches that are formed because of genetic recombination. It is used to identify mutations.

67. Who is considered the first person to study plant genetics?

Mendel

68. Why do you think one of the most common plants used in plant genetic research is grass?

Common, fast life cycle, easy to grow

69. Why do you think people say “if you research wheat genetics, you have mastered how to perform any plant genetic research?”

Wheat comes from three distinct ancestors

Fruits Fruits Fruits

70. What are the three anatomical categories for fruit? What defining characteristics of each category makes it different from the others?

aggregate- many ovaries, one single flower with multiple fruits multiple- many flowers, one fruit simple- one fruit, one flower

71. Why might fruits have evolved to be more fleshy fruits than dry?

more appealing to eat, easier to spread seeds

72. What is the importance of having a dead pericarp for dry fruits?

Dead pericarps protect the fruit and help germintation

73. Describe two methods of fungi reproduction.

sexual, asexual OR fragmentation, budding, spores

74. What is the first method of sexual reproduction among fungi?
    a. Homothalism
    b. Spores
    c. Anastomosis
    d. Clamp connection
    e. Plasmogamy

Plant evolution

75. Name three ways plants have evolved to prevent water loss.

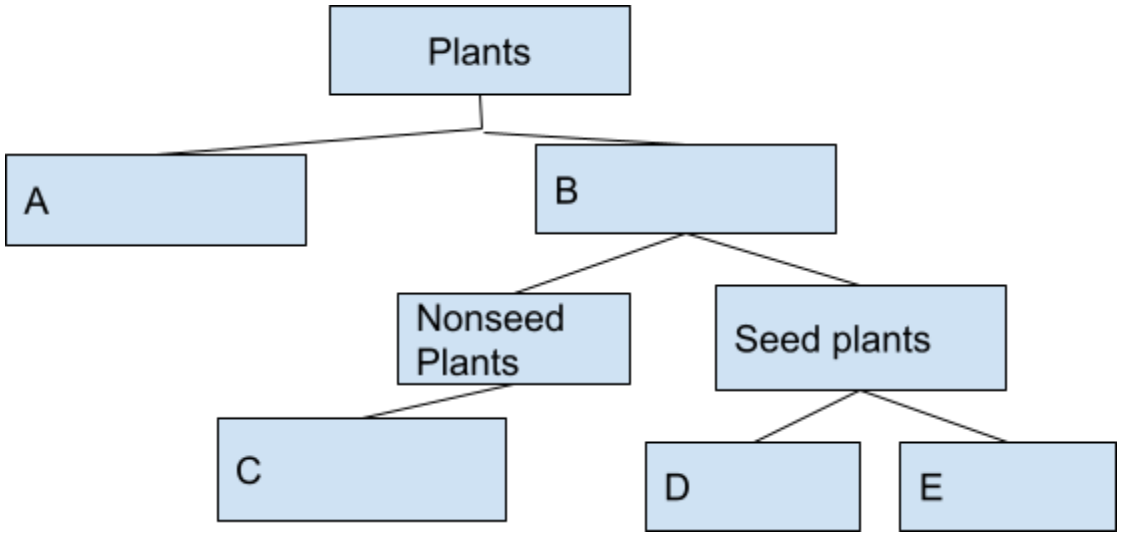
vacuoles, stomata on the bottom of leaf, leaf hairs, cuticle, symbiotic relationships

76. During which period in the paleozoic era did the first vascular plants appear?

silurian

77. During which period in the paleozoic era did plants develop stomatas?

denovian

78. 

A: nonvascular B: vascular C: ferns D: angiosperms E: gymnosperms

Propagation

How would you propagate the following plants?

79. Succulent

Pluck a leaf, let it callus; buds; cut the head off; let little plants grow on the stem

80. Lettuce

cut the head, but the base in water

81. Aloe

take the pups, take a leaf

82. potato

cut out the eyes, put in soil

83. lavender

cuttings

84. String of pearls

cuttings

85. Tomato

cuttings (side shoots)

Faming

86. What was the Green Revolution, and what impact did it have on developing countries? Discuss two subsequent impacts of the Green Revolution on the environment.

The Green revolution was when farmers began using fertilizers and pesticides to increase crop yields. Because fertilizers meant that there was higher crop productivity and pesticides meant there were less pests killing their crops, developing countries saw an increase in product, income, and supplies. Starvation was also seen to be lower in many countries.The green generation ended up benefiting many developing countries, but there were many impacts on the environment that the green revolution caused. For example, because there was an increase in the amount of crops, it degraded the integrity of the soil. This meant that it would be harder to grow these crops in future seasons and it could create deserts because soils are less productive. There was also a heavy use of synthetic fertilizers and chemical pesticides which are both harmful to the overall environment. Fertilizers that end up in waterways due to run off which could increase eutrophication and affect marine biodiversity.

87. Identify and discuss three practices used by farmers to protect their soils.

Crop rotation is one of the practices used by farmers to protect their soils. Farmers will oftentimes grow different crops each year or at different nutrients because it allows the soil to restore its nutrients. Additionally, since plants are constantly planted there, it could prevent erosion and reduces pests because every plant has different pests. Contour farming is when plowing furrows sideways across a hillside perpendicular to its slope. This helps soil because the sides trap water and could prevent erosion. Preventing erosion is important for soil health because it prevents nutrients from being washed away. Intercropping is when there are alternating bands or mixed arrangements of crops. This is important because it increases ground cover which prevents erosion. It also decreases pests and helps replenish soil while also increasing crop yield

88. Describe how the dust bowl was a perfect example of why environment is crucial for understanding where to farm crops.

Overfarmed land, caused soil to dry out, not enough nutrients, caused a lot of loose soil, rotate crops, soil quality is important

Carbon and Nitrogen cycle

89. How do bacteria perform denitrification?

take the oxygen to oxidize carbon. nitrate --> atmospheric nitrogen

90. Describe the mutualistic relationship between plant roots and soil criteria.

plants --> holds soil in place, helping erosion soil --> nutrients, water

91. What role do plants play in the carbon cycle?

plants absorb carbon dioxide, when they decompose they add more

Principles of hydroculture and hydroponics

92. What makes peat moss the perfect supplement for growing plants without soil?

nutrients, holds moisture, low pH

93. What are the positives and negatives of hydroculture?

negatives: expensive, power outages, diseases Advantages: maintains soil quality, control over climate, saves water, fast growth

94. Transitioning from typical soils to supplements such as peat moss can cause a lot of stress on plants. What are some signs of stress? How can you avoid stressing out the plant?

wilting, losing leaves, change in color; smooth transition between environments

95. What does LECA stand for? What are the benefits of using LECA as compared to soil?

lightweight expanded clay aggregate; holds water, lots of space, less pests, reusable

Medicinal plants:

96. JC recently got a terrible sunburn in the outer banks. He uses aloe vera in hopes it will cure his sunburn. Why is this thought process incorrect? What does aloe vera really do for sunburns?

Aloe relieves the burn, it does not produce collagen to help the skin.

97. JC has been having terrible tooth pain from eating too many candy canes. What plant oil should he use to soothe his teeth? What properties of this plant allow it to soothe toothache?

Clove or peppermint. Clove oil has antibacterial and anesthetic properties

98. In ancient Chinese medicine, ginseng was a popular plant used to cure many diseases. What are some diseases people may use ginseng for?

diabetes

99. What are phytoestrogens? What type of disorders do they cure? Why is this so?

mimic estrogen, increase estrogen levels, menopause