

Quiz 1 – study guide
(also a preliminary study guide for midterm #1)

Be able to answer the following questions, and understand the concepts and vocabulary pertinent to each question. You can expect to see a subset of the following questions verbatim on Quiz #1 and Midterm #1, but some will be reformulated – be prepared to think and apply concepts.

Lecture 1: Jan 16 (this lecture delivered in lab during week 1)

- 1) What is an adaptive trait?
- 2) What is a selective pressure?
- 3) What are experimental controls, and why are they important?
- 4) What is the difference between Lamarckism and natural selection as proposed by Charles Darwin?
- 5) What is the mechanism that drives evolution?
- 6) Describe how natural selection works – you might want to use an example that we discussed in class or you can use an example of your own design. In your example, be able to identify the adaptive trait(s) and selective pressure(s) at play.
- 7) In plant breeding, what are the advantages and disadvantages of sexual and asexual reproduction?
- 8) For plants in nature, what are the advantages and disadvantages of sexual and asexual reproduction?
- 9) Name one reason that using common names instead of scientific names can be problematic
- 10) What is a species?
- 11) Know and understand the scientific method

Lecture 2: Jan 18

- 1) Draw the tree of life that we sketched in lecture, including labeled branches for the three domains, as well as the four kingdoms of eukaryotes we identified. Place a circle around the branch/branches in which organisms DO NOT HAVE a cell nucleus, and label the circle appropriately. Next, circle the branch/branches in which organism have cell walls made of cellulose, and label the circle appropriately.
- 2) What is a protist?
- 3) List four (we discussed six) roles that vacuoles play for plant cells.
- 4) Which of the following scientific names is correctly reported:
A) *nicotiana glauca* B) *Nicotiana glauca* C) *Nicotiana Glauca* D) *Nicotiana glauca* E) None of the above

- 5) What are the three components of cell theory?
- 6) why are cells small?
- 7) List and describe the role of three different plastids (you may not use leucoplast or proplastid).
Plastid #1:

Plastid #2:

Plastid #3:
- 8) A plant feature (e.g., flower or fruit) is orange. What cell structure contains these pigments that impart the orange color, and what is the name of the pigment class.
- 9) A plant feature (e.g., flower or fruit) is red/blue/purple. What cell structure contains these pigments that impart the red/blue/purple color, and what is the name of the pigment class.
- 10) Be able to identify the plant cell structures we discussed in lecture.

Lecture 3: Jan 23

- 1) Describe the properties of water that make it an essential molecule for living organisms.
- 2) What is the heat island effect?
- 3) How do plants help minimize the heat island effect?
- 4) Provide the molecular formula and the structural formula for the following molecules:
 - i) water
 - ii) molecular oxygen (i.e., two oxygen atoms bonded together)
- 5) The following numerical sequence is printed prominently on a bag of fertilizer: 1-4-6
What does the "6" indicate? The "4"? The "1"?
Is this a fertilizer that is likely to be applied early in the growing season? Why or why not?
- 6) Using a structural formula such as that we drew in lecture, draw approximately six H₂O molecules in close proximity, and indicate H bonds between these molecules.
- 7) What essential elements are considered macronutrients?
- 8) List the so called "primary macronutrients" and "secondary macronutrients".
- 9) Where specifically (i.e., from what molecules) do plants obtain C, H, and O?
- 10) How does water exit the leaves of a plant?

Lecture 4: Jan 25

- 1) There are _____ electrons involved in the covalent bond that joins N atoms in a molecule of N₂.
- 2) Sucrose is a combination of _____ and _____.
- 3) A protein that has lost its 3D shape and therefore cannot perform its intended job/function is said to be _____.
- 4) Three stresses commonly cause the condition mentioned in question #4, they are: 1) pH; 2) toxins in the environment; and 3) _____.
- 5) With regard to the stress you listed in question #5, name two adaptive traits that an individual plant might have that helps minimize that stress.
Adaptive trait #1:
Adaptive trait #2:
- 6) If no animal can digest cellulose, how can ruminants (cows, horses, etc.) digest plant material that is high in cellulose?
- 7) How do glyphosate herbicides such as “Round-up” kill plants (OK to be general here – but be accurate).
- 8) Define nitrogen fixation
- 9) You are driving through the Santa Ynez Valley with your snobby Aunt Mildew, and you propose to visit a quaint looking winery where the vines look particularly healthy. You propose to stop there and taste the wine, but snobby Aunt Mildew disagrees and yells at you disgust (her usual tactic): “Are you kidding me?!! Don’t you know ANYTHING?!! Look how shabby their operation looks – why...why...they don’t even weed in between the rows of grape vines!!” You have had enough of Aunt Mildew at this point, and you notice that what she thinks are weeds are actually a mix of various legumes, such as peas and clover, that the farmer has intentionally planted. Explain to her what this type of planting is referred to (tell her the name we discussed in class), why the farmer does it (i.e., what the plants provide), describe briefly (1 sentence) the chemistry of the service that legumes provide, and finally tell her why legumes but few other plants are useful in providing this benefit.
- 10) What types of organisms can break the glucose-glucose bond in cellulose?
- 11) What is an essential amino acid?
- 12) What is a “complete protein”?
- 13) Provide an example of two plant-based foods that, when combined, provide a complete protein.
- 14) How do plants produce glucose, and what is its role in nearly all cells? Where is fructose found and how is it similar and different from glucose?
- 15) Know the jobs/importance of the following enzymes: nitrogenase, cellulase.