

Name: _____

Please keep your answers brief and to the point. Ask if you have questions.

Fill in the Blank: *There may be more than one correct answer for a particular question; choose the best answer you can (each blank is worth 2 points; this section totals 28 points).*

1. In the _____ reactions of photosynthesis, _____ is split to produce oxygen.
2. Soils generally give off carbon dioxide because the organisms living in the soil (including plant roots) are _____.
3. _____ plants use RUBISCO, but not PEP carboxylase, during the carbon fixation reactions of photosynthesis.
4. The most water efficient photosynthetic pathway is the _____ pathway.
5. Phosphorus availability in soils is generally limited by soil chemistry, while nitrogen availability is usually controlled by _____.
6. Soil texture is determined by the relative proportions of sand, _____, and _____.
7. A _____ plant drops its leaves when water is scarce.
8. An individual unit of a clonal plant is referred to as a _____ while the entire, genetically identical individual is the _____.
9. A plant that is adapted to hot and dry environments is likely to have leaves that are/have _____ and _____.

10. The _____ is the collection of seeds in the soil at a given location.

Short Answer

11. Define/describe (3 each):

a) ectomycorrhizae

b) photorespiration

c) apical meristem

d) photosynthesis (write the equation; does not have to be balanced)

e) monoecy

12. Give three distinct reasons why plants are crucial for life on Earth as we know it (6).

13. Briefly explain why the concept of the “individual” is not straightforward for many plants (3).

14. Answer the following two parts of this question about water potential.

a) Name and briefly describe the two components of water potential as presented in lecture (4).

b) After you’ve forgotten to water your mesophytic potted plant for two weeks, you notice it’s wilting, and water it until there is water running out of the bottom of the pot. Describe what has happened to both soil and water potential that will now allow the plant to take up water, including water potential gradient and transpiration in your answer (5).

15. Fill in the following table regarding different modes of reproduction for plants, how they affect genetic variation in the population, and one potential advantage and disadvantage of each (some advantages and disadvantages may be the same). Assume that only that mode of reproduction occurs in the population (1/2 point each).

	Agamospermy	Clonal Growth	Outcrossing	Self-fertilization
Relative amount of variation in population (rank 1 to 4 with 1 having the <u>most</u> variation)				
Advantage				
Disadvantage				

16. This figure from Taylor et al. (2006) presents some of their results following salt cedar removal along the Rio Grande River in New Mexico. Explain what these results mean, and how they may affect future restoration efforts in this ecosystem (5).

Short Essay (follow the instructions and answer one possibility for each of the two questions below; 2-3 paragraphs of complete sentences for each; each answer is worth 14 points.)

17. Choose one of the following. Be creative, but realistic in your answer, and make sure it is grounded in the topics we have discussed already this semester. Remember to organize your thoughts before you start writing; feel free to use the backs of pages to sketch out your thoughts, outline, etc. Clearly indicate where your formal answer begins.
- a) In the morning on your way to school you notice that the native, drought-tolerant Buffalo grass in your neighbor's yard is short (about 5 cm tall). When you get to school you see that the Buffalo grass next to the Business Building is much taller (about 20 cm tall). Write a hypothesis based on this observation, and describe an experiment you would conduct to test this hypothesis. Include in your answer the type of data you would collect, and the results you would need to accept your hypothesis.
 - b) You have inherited five large tracts of prairie in North Texas. When you inspect these areas, you notice that several woody species are beginning to crowd out the grasses and other herbaceous plants typical of native prairie. You read the Taylor et al. (2006) and Ansley & Castellano (2006) papers and get some ideas about how you might eradicate these woody species from your land. Write a hypothesis that you could investigate on your land to test two different methods of eradication, based on what you learned from those papers. Briefly describe the experiment you would conduct. Include in your answer the type of data you would collect, and the results you would need to accept your hypothesis.

18. Choose one of the following three questions to answer:

- a) Compare and contrast the three major photosynthetic pathways of plants (C_3 , C_4 , and CAM). Include in your answer the differences in biochemical pathways among the three, relative abundance worldwide, characteristics of the habitats where they occur, and additional information discussed in lecture.
- b) Compare and contrast the symbiotic relationships between nitrogen fixers and plants and between mycorrhizae and plants. Include the characteristics of organisms involved in each, the types of plants, how common these associations are, the exchange of materials between the organisms, and additional information discussed in lecture.
- c) Angiosperms may be wind, water, and/or animal pollinated. Discuss characteristics of flowers that are specialized for each type of pollen dispersal and reception. Include in your answer a brief discussion of how pollination syndromes can promote assortative mating, and the implications of this for the genetic composition of a particular population.