

Introductory Botany
Spring 2007
Review Questions for the Final Exam

The Final Exam is Tuesday, May 1, 8:00 a.m. - 10:00 a.m., in 252 Science Building.
The exam covers Fungi, Nonseed and Seed Plants, Longwood Gardens,
and major concepts of the course.

My philosophy is that exams should be both a learning experience and an evaluation. Consistent with my view, I give you a set of questions that may appear on the exam before the exam.

The final exam will include about 40 questions and is worth 80 points. About 32 of these questions will be multiple-choice, fill-in-the-blank, or true-false questions. Eight questions will be short-answer style questions, chosen from the questions on this sheet. In addition, most questions on this sheet that are not chosen for short-answer questions will be converted into multiple-choice, fill-in-the-blank, or true-false questions.

Advice

Be concise in answering the questions: a paragraph (1/3 to 1/2 a page) is enough for any of them. Figures or tables may be appropriate for some questions. Note well: being concise does not mean giving a minimal answer. You should --- of course --- give as much relevant detail as possible in a half a page or less.

Lists, figures or tables may be appropriate for some questions. **Figures must be large and neatly labeled. Tables must have labeled columns and rows.** What is wrong with the following table?

	Leaves	Height	Trait
Banana	Large	Tall	Yellow fruit
Bamboo	Green	Tall	Woody stem
Begonia	Hairy	Tall	Evergreen

On the other hand, do not use a "shotgun" approach to answer questions. Use the shotgun approach to answering questions only as a last resort, not a general way of answering questions. In a shotgun approach, you would write anything that seems connected to a concept, and like a shotgun blast spray pellets of information that may not be relevant to the question. If you have little idea how to answer a question, this is a decent strategy, because at least some of what you say may earn you some credit. On the other hand, don't shotgun if you think you have a clear idea of how to answer a question, because shotgunning indicates some misunderstanding.

For example:

Explain why a red onion is red. (4 points)

Shotgun answer --- Onions are bulbs. They are red because we see them as red. Other plants are not red because we see them as having other colors. The tissue of an onion has red pigments in it, giving the onion a red appearance. Green leaves of plants are not red because they have green pigments. Some leaves and fruits have both green and red pigments. Green pigments are called chlorophylls. [Would earn 1 point.]

Straightforward answer --- Red onions are red because they contain anthocyanins that are stored in the cell's vacuole. The pigments are red because they reflect red wavelengths of sunlight, but absorb all other visible wavelengths of sunlight. [Would earn 4 points.]

Be prepared to use terminology, but use it correctly. For example, you must understand the meaning of the term *spore* to explain the role of the *gametophyte* in the plant life cycle. It's too easy to veer off course when you don't know the correct term for a concept and instead try to explain it in common language.

Don't abbreviate words, except those that are abbreviated by convention (for example, cm, hr, sec).

Don't use "etc.", "and so forth" or any similar open-ended phrase. The instructor can only guess how you would continue from the preceding thoughts. For example, if you wrote "The cell wall is made of cellulose, lignin, etc.", I can assume you mean lima beans, roses and roots --- or just about anything else. Instructors generally interpret use of "etc." on an exam to mean: 1) you don't exactly know; or 2) you're too lazy to write it out.

I encourage you to discuss these amongst yourselves, use your notes, and the textbook. Please do not ask the instructor to recite the answers. The goal here is learning and critical thinking, not whether you can recite what the teacher says. You may ask the instructor to clarify a question if it is unclear. Be certain that you understand this: the point here is not that you shouldn't ask for help, but instead that you bear the burden of effort here. If you're lost, ask for help.

Questions:

Note that for many of the numbers below, there are two or more questions. Be certain that you answer each question.

Expecting a topic to be included in the questions above, but it is not? Keep in mind that it may very well appear in other questions on the exam. These study questions are NOT a comprehensive guide to what could appear on the exam.

1. Prepare a labeled diagram illustrating the life cycle of a mushroom-producing fungus. In your diagram, clearly identify both plasmogamy and karyogamy.
2. Describe how four traits of fungi that may be adaptations permitting their success as parasitic or saprobic organisms.
3.
 - a. Other than the deuteromycetes, what are the two largest groups of fungi?
 - b. For the two groups that you named, describe the structures by which they produce sexual spores (spores by meiosis).
4. Many people cringe at the thought of fungi. Nevertheless, fungi are important to humans in a variety of ways. List five benefits of fungi for humans. For each benefit, provide an example (name) of a fungus that provides the benefit.
5. Many people cringe at the thought of fungi, with at least some justification. List five harmful effects of fungi on humans. For each harmful effect, provide an example (name) of a fungus that causes the harm.

6.
 - a. Describe the: a) sporophyte, and b) gametophyte of a moss.
 - b. Some mosses produce several sporophytes on each gametophyte. Could any of these sporophytes be genetically identical? Explain.
 - c. Would the spores produced in a single moss sporophyte be genetically identical? Explain.
7. Briefly discuss the importance of *Sphagnum*, both as a source of energy and for its role in ecosystems of the world.
8. Climatologists and global ecologists are concerned about the role of mosses in affecting global climate change. Explain a mechanism by which mosses could play a key role in our future global climate.
9. Monilophytes and Lycophytes are a paraphyletic group, but botanists recognize that they have similar life cycle features. What features of their life cycles do monilophytes and lycophytes have in common? In your answer, briefly describe each feature.
10.
 - a. What traits are included within the seed condition, as compared to the free-sporing condition? (A list is sufficient.)
 - b. Why might the seed condition have led to the great success of seed plants?
11.
 - a. Describe the: a) sporophyte, and b) gametophyte of a true fern.
 - b. Some ferns produce several archegonia on one gametophyte. Could any of the eggs from the archegonia be genetically identical? Explain.
 - c. Would the spores produced in a single fern sporangium be genetically identical? Explain.
12. Briefly describe how the four major groups of extant gymnosperms, when compared to each other, demonstrate the concept of disparity. If you wish, you may use a labeled table.
13. In a half-page, summarize the economic importance of the gymnosperms. Support your discussion with specific examples of taxa.
14. Using a labeled figure, compare a mature pine seed and a kernel of corn. In your illustrations, label any of the following that are present: seed coat, ovary wall, endosperm, female gametophyte and embryo.
15. Are the traits that define a diverse taxonomic group necessarily the same as the traits that caused the diversification of the group? Explain, using the angiosperms to support your answer.
16. How is endosperm formation different in the basal angiosperms, as compared to the crown group of angiosperms? If you prefer, use labeled diagrams to support your answer.
17. What are the four major taxonomic groups of plants? Prepare a table showing five principal differences of the groups. (Do not worry about whether the major taxonomic groups are paraphyletic / non-monophyletic).
18. Briefly contrast the following terms, as they are applied to plants:
 - a. pollen vs. spore
 - b. ovule vs. ovary

19. Briefly define the following terms, as they are applied to plants:
 - a. heterosporous
 - b. free-sporing
 - c. alternation of generations
20. List and briefly define four distinctive characteristics of plant development (hint: the answer is not cell division, growth, differentiation and morphogenesis).
21.
 - a. Describe the role of polyploidy in plant evolution.
 - b. Asexual reproduction is common in plants. Explain.
22.
 - a. Propose three hypotheses that could account for the great species richness of orchids. For each hypothesis, briefly explain how species are created.
 - b. Which species concept are you using in your answer to a? Briefly explain.
23. What are two biological principles that are illustrated by so-called carnivorous plants? Justify your answer.
24. Describe five purposes of Longwood Gardens to human society or to the field of plant biology.