Start time _____ *End time* _____

I. Multiple choice (58 points)

Each question in this section costs either 2 or 0. Please **mark** the appropriate answer on the **scantron**.

1. Which of the following groups is tightly adapted to insect pollination?
   A. Orchids
   B. Grasses
   C. Ferns
2. Which life form is prevalent in North Dakota?
   A. Phanerophytes
   B. Cryptophytes
   C. Xerophytes
3. What is the botanical name of organs like potato vegetable?
   A. Bulb
   B. Tuber
   C. Rhizome
4. A pollen grain is:
   A. Composed of 5 cells, each is a spore
   B. Male gametophyte
   C. Diplont
5. An embryo is:
   A. Composed of $1n$ tissue
   B. Composed of $2n$ tissue
   C. A mature gametophyte
6. Gametophytes in ferns, conifers, and flowering plants tend to be:
   A. Small
   B. Diploid
   C. Dominant
7. The name for the complete female zone of a flower is the:
   A. Ovule
   B. Gynoecium
   C. Perianth
8. All of the _____ taken together compose a corolla.
   A. Petals
   B. Anthers
   C. Sepals and petals
9. Which choice does NOT belong to the pistil?
   A. Macrosporangium
   B. Ovule
   C. Endoderm
10. Microspores (male spores) are produced by:
    A. Mitosis
    B. Meiosis
11. In a flowering plant life cycle, female gametophyte is:
    A. Gynoecium
    B. Pollen grain
    C. Embryo sac
12. Which of the following choices represents the correct sequence?
    A. Microspores → meiosis → gametophyte → sperm cell
    B. Meiosis → microspores → gametophyte → sperm cell
    C. Gametophyte → meiosis → egg cell → megaspore
13. The oocyte (egg cell) is:
    A. Diploid
    B. Triploid
    C. Haploid
14. The endosperm$_2$ (endosperm of angiosperms) is:
    A. Tetraploid
    B. Triploid or diploid
    C. Haploid
15. The endosperm$_1$ (endosperm of gymnosperms) is:
    A. Tetraploid
    B. Triploid or diploid
    C. Haploid
16. Double fertilization in flowering plants refers to the union of:
    A. One sperm with the egg and one sperm with nucellus
    B. Two sperms with two eggs
    C. One sperm with the egg and one sperm with central cell

17. ABC-genes are involved in:

    A. Determination of different parts of flower
    B. Determination of different parts of fruit
    C. Determination of different parts of seed

18. Flowers pollinated by bats should:

    A. Open at nights
    B. Have big size
    C. Both of above

19. Which is NOT part of a seed?

    A. Embryo
    B. Pericarp
    C. Endosperm

20. The reproductive cycle of the bryophytes resembles other land plants because:

    A. Their life cycle is gametic
    B. Their life cycle is sporic
    C. Their diploid stage is dominant

21. Which of the following is the adaptation for animal distribution?

    A. Wings on the fruit or seed
    B. Hard seed coat
    C. Floatable pericarp

22. Male heads of the *Mnium* moss contain all of the following except:

    A. Paraphyses
    B. Antheridia
    C. Venter surrounding the egg

23. Which of the following is NOT true for seed plants?

    A. They took female gametophyte under the cover of mother sporophyte
    B. They invented pollination
    C. They did not resolve a conflict between sizes of gametophyte and sporophyte

24. Which group is more basal?

    A. Angiosperms
    B. Conifers
    C. Cycads

25. Which of the following is NOT a conifer?

    A. Fir
    B. Cedar
    C. Ginkgo
    D. Cypress

26. Second fertilization in angiosperms:

    A. Issues a finishing signal to endosperm development
    B. Starts the development of normal embryo
    C. Helps plant to avoid the creation of non-fertilized seeds

27. Mature pine tree is:

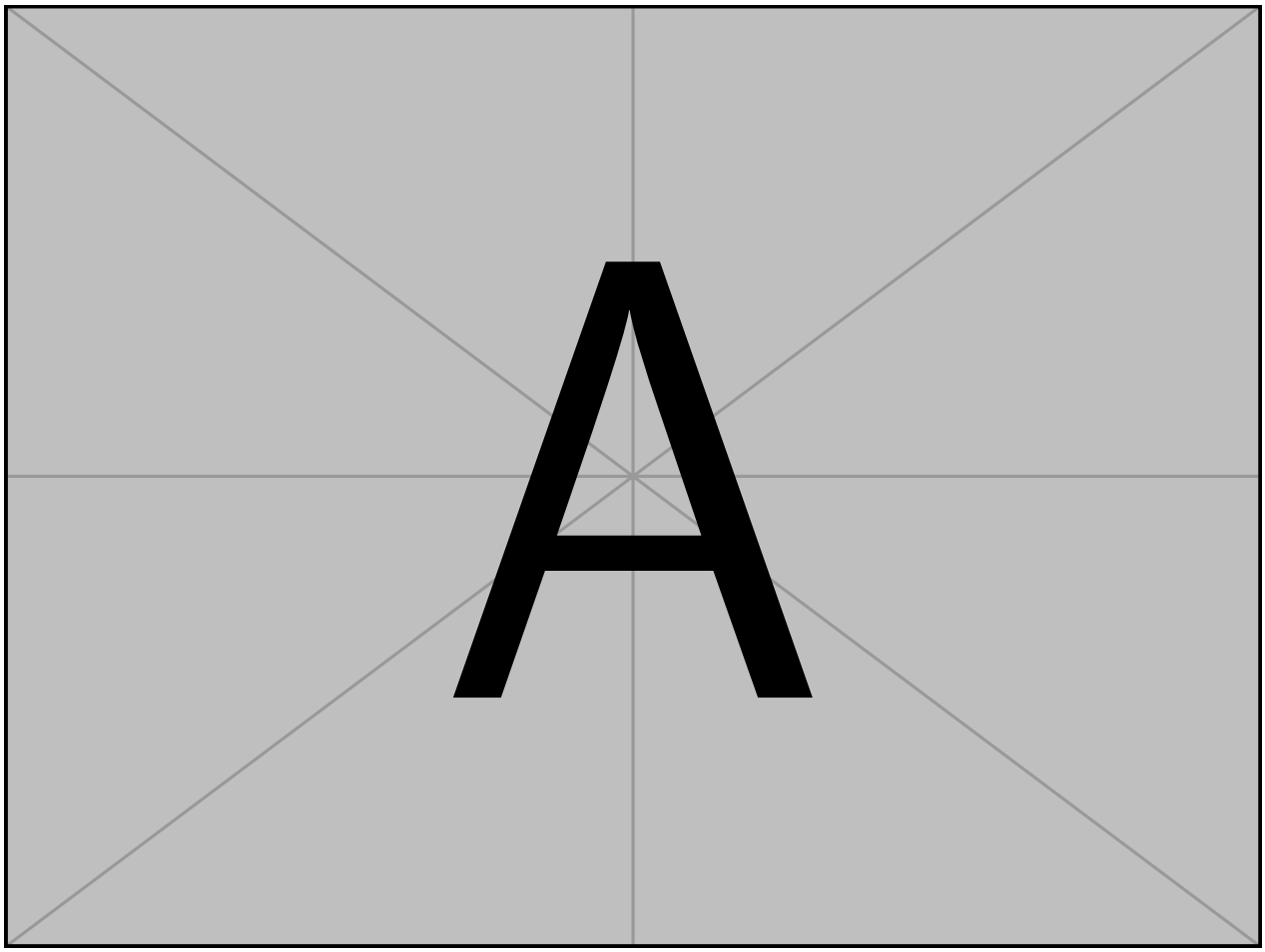
    A. An angiosperm
    B. A haploid plant body
    C. A sporophyte
    D. All of the above

28. The most ancestral living angiosperm is:

    A. *Gikngo*
    B. *Amborella*
    C. *Archaefructus*

II. Short answers (42 or even more points)

1. Mycoparasitic, achlorophyllous plant *Lacandonia schismatica* (below) grows in the rain forests of Mexico. It is called "*schismatica*" (i.e. heretical) because its flowers have pistils placed outside of stamens, and stamens—in the center of flower. How could this placement be favorable for the plant? (*plausible explanation* = 10 *points*)



2. Please describe what could be a plant "located" at the point **A** in the morphospace of life forms below. How might this plant look? If you have an example in mind, please list it here. (*plausible explanation with example* = 10 *points, without example* = 5 *points*)