



Exploring the World of Science

University of Michigan Science Olympiad
2021 Invitational Tournament

Botany C

Test length: 50 Minutes

Team name: _____ **Team number:** _____

Student names: _____



Welcome to the University of Michigan 2021 Invitational Botany C test! Make sure you have a stable internet connection and are ready to compete!

For this test, you are allowed the following resources:

- A Google Meet/Zoom/Skype/Phone/Video call with your partner
- A cheat sheet, printed or in pdf format on your computer
- Non-programmable, non-graphing calculator
- Scratch paper

You MAY NOT take advantage of the following resources. Doing so will result in a disqualification plus 30 points added to your team's overall score.

- ANY internet resource
- Help from any person other than your partner
- A printed version of the test

INSTRUCTIONS

This test consists of 50 questions and you will have 50 minutes to complete it.

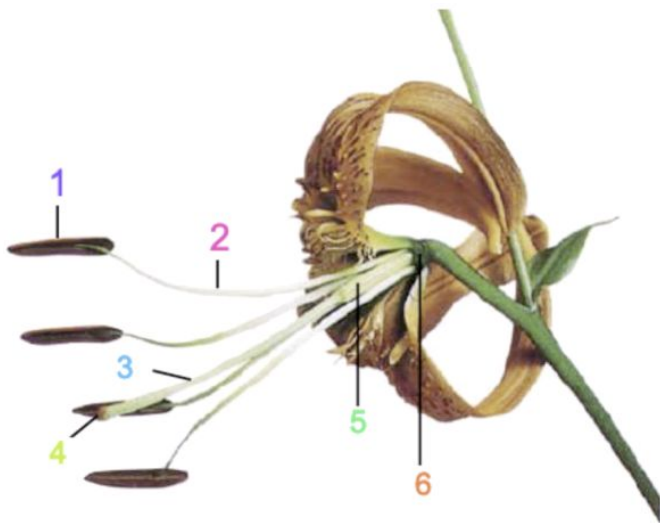
The Tiebreakers for this test will be in the following order: 50, 49, 48, ..., 2, 1.

If you experience technical difficulties during the test:

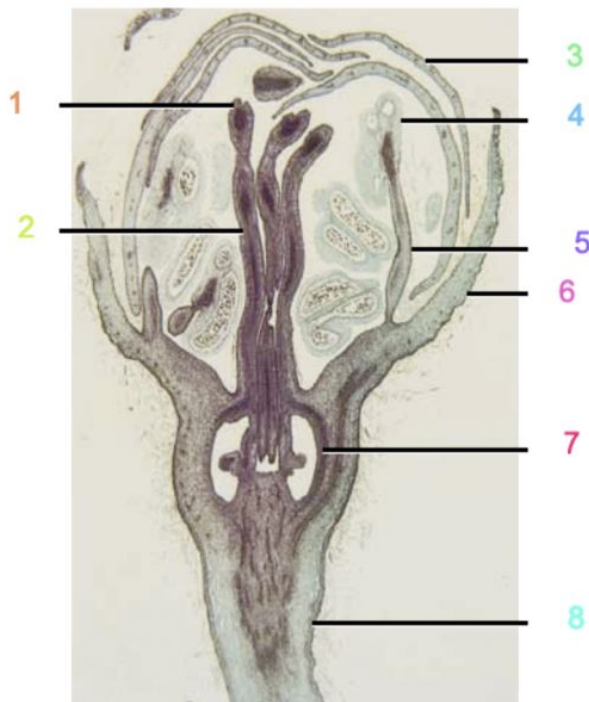
- Immediately contact the event supervisor through the classroom feature on Scilympiad, stating clearly what issue you are having.
- If your work is not saving/submitted, take screenshots of your answers on Scilympiad and submit them to this [google form](#). Try to stay within your allotted 50 minutes.

Some of the questions have prompts that tell you to frame your answer in a specific way. This is merely to make it easier for us to grade; we will still hand grade your test.

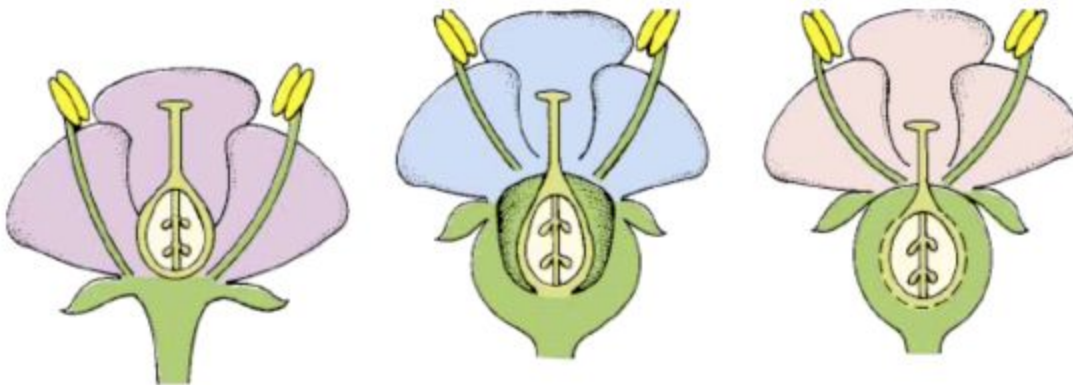
1. What is the stalk of an inflorescence called? (Answer with one lowercase word.)
2. What are the two fertile parts of a flower?
 - a. stamen, carpel
 - b. sepal, petal
 - c. stamen, sepal
 - d. carpel, petal
3. What is the term for a flower species containing its reproductive parts of separate flowers? (Answer with one lowercase word.)
4. Name the fungus that causes black stem rust. (Answer with a full binomial name, first letter capitalized.)
5. What gene was inserted into wheat to make it resistant to the above fungus until recently? (Answer with the proper name of the gene, capitalization included.)
6. Assign each of the following plants as either a monocot or dicot:
 - a. california poppy
 - b. orchids
 - c. rice
 - d. bananas
 - e. redwood
 - f. cacti
7. Assign each of the following characteristics as belonging to a monocot or dicot:
 - a. parallel leaf veins
 - b. taproot system
 - c. flowers in groups of 5
8. Label the below image:



9. Label the below image:



10. Label the following flowers as either epigynous, perigynous, or hypogynous:



11. What is the name of the process of producing fruit without any seeds? (Answer with one lowercase word.)

12. Explain how CAM plants overcome dehydration.

13. The rate of water evaporation from a plant doubles for every [BLANK] degrees C increase in temperature. (Answer in number format)

14. Stomata normally close when the external temperature reaches:

- a. 30-35 C
- b. 35-40 C
- c. 40-45 C
- d. 45-50 C

15. Chlorophyll b ultimately transfers its energy to photosynthesis without the aid of chlorophyll a.

16. What is the optimal absorption peak of Photosystem II?

17. What is the name of the cryptochrome complex between Photosystem II and I?

18. What is the starting compound of the Calvin cycle?

19. What is the name of the enzyme that is critical for carbon fixation in the Calvin cycle?

20. Most of the fixed carbon in plants is stored as glucose.

21. Name the deficiency:

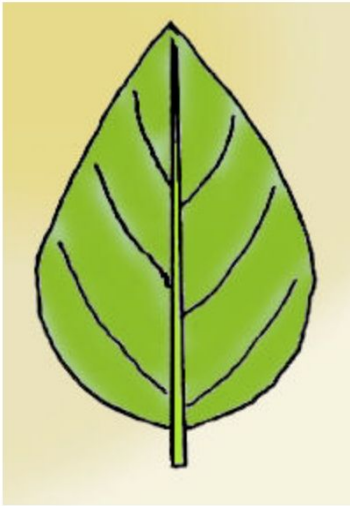


22. Name the deficiency:



23. Name the largest and most diverse group of plants living today, other than the angiosperms?
24. What part of a plant's root helps direct it towards resources?
25. Name the three regions of general root development.
26. What is the term used to describe parenchyma tissue with large, intracellular spaces?
27. Substances passing through the cortex that only travel via the cell walls follow what pathway?
28. What is the name of the layer that replaces the epidermis as a protective covering in woody roots?
29. What is the term used to describe young, lateral roots?
30. What is the difference between nonfleshy and storage roots?
31. What is the principle of parsimony?
32. What bacterium houses the Ti plasmid, which is used to transfer foreign genes by bombarding plants with high-velocity microprojectiles of RNA or DNA?
33. What vesicles play the role of statoliths in plants?
34. What plant hormone is primarily responsible for gravitropism?
35. What are the two main families of plant photoreceptors?
36. What's the equation for nitrification?

37. What type of shape is the below leaf?



38. Classify the following plants as either short-day, long-day, or day-neutral:

- a. chrysanthemums
- b. poinsettias
- c. asters
- d. California poppies
- e. potatoes
- f. corn
- g. cucumbers

39. Say you have a short-day plant whose photoperiod is 12 hours. You store it in an area that has 13 hours of continuous nighttime, except for 10 minutes in between when the plant is illuminated with light. Do you expect this plant to form flowers? Explain your answer thoroughly.

40. Define "canker," in the context of plant disease.

41. What type of organism causes anthracnose?

42. Name the below plant disease:



43. The relationship between the black walnut (which secretes juglone) and surrounding plants can best be described as which of the following?
44. Name the group of plants that nurture the young embryo sporophyte within the paternal gametophyte.
45. Give the general reaction equation for the Calvin cycle.
46. In plants that use CAM photosynthesis, what four-carbon acid is produced as a form of carbon dioxide storage at night?
47. Name the specific type of cells that help transport water in the xylem of vascular plants, have lignified walls, and have perforations at their end plates.
- Parenchyma
 - Collenchyma
 - Sclerenchyma
 - Tracheids
 - Vessel Elements
48. Approximately what percentage of plants exhibit mycorrhizae? (Enter your answer as a number with no other characters.)
49. Name the biological phenomenon by which an organism produces chemicals that influence the growth, survival, and reproduction of surrounding organisms. (Capitalize the first letter of the word and don't add any additional characters.)
50. Name the virus that causes the yellowing and stunts the growth of tomato plants. (Make sure your answer is lowercase and to include the word "virus.")