

MICROBE MISSION DRAFT RULES 17

1. DESCRIPTION: Teams will answer questions, solve problems, and analyze data pertaining to microbes.

A TEAM OF UP TO: 2

EYE PROTECTION: C

APPROXIMATE TIME: 50 minutes

2. EVENT PARAMETERS: Students will provide goggles and two non-programmable, non-graphing calculators. Each team may bring one 8.5x11" sheet of paper that may contain information on both sides in any form and from any source. The sheet may not be contained in a sheet protector or any annotations affixed but may be laminated. Measurements must be made to the precision of the device.
3. THE COMPETITION:
 - a. Participants will apply age appropriate scientific process skills, perform simple laboratory procedures such as measurements, or use probes to collect data based on the information provided to answer the given questions, possibly at timed stations, pertaining to different type of microbes.
 - b. Some questions/stations may involve the actual use of a microscope. If no microscopes are available, high quality photographs with appropriate scales may be used instead.
 - c. Live specimens are limited to: baker's yeast, ciliates, amoebae, and algae. Pictures and prepared slides are appropriate for all microbial types.
 - d. The competition will cover all of the topics and not emphasize just one area such as microbial disease. Disease questions will be restricted to the 2017 Microbial Diseases on www.soinc.org. Topics listed in *italics* will only be assessed at the National Tournament.
 - i. Different kinds of microscopes and their uses. Parts & function of the light microscopes, principles of microscopy, and magnification and field of view determination.
 - ii. Estimation/Calculation of size based on scales in pictures or microscopic information and amount of the visual field occupied.
 - iii. Recognition and function of nuclei, mitochondria, chloroplasts, and their possible microbial origin.
 - iv. Differences (e.g., size, environment, structure, prokaryotic vs eukaryotic, etc.) among prions, viruses, bacteria, Archaea, fungi, algal, protozoans, and parasitic worms.
 - v. Names for and recognition of various bacterial shapes.
 - vi. Diseases caused by microbes, their treatment/prevention, and resistance to these treatments.
 - vii. Measuring bacterial growth, growth curves, and graph interpretation.
 - viii. Beneficial microbes
 - ix. Division C only- Isolation of bacteria by streaking and serial dilution.
 - x. Division C only- Gram stain uses and differences between Gram⁺ and Gram⁻
 - xi. Division C only – Important aspects of spores and cysts
 - xii. *Causes and effects of microbial population explosions*
 - xiii. *Microbial competition and communication*
 - xiv. *Microbiomes*
 - xv. *Biofilms*
4. SAMPLE QUESTIONS:
 - a. Provide two differences among bacteria, viruses, and fungi.
 - b. Using the following key, determine (from pictures) which cell A,B, or C is considered alga.
 - c. Based on the following graph, determine which organism is best suited for growth in acidic environment.
 - d. What is the appropriate length of an organism that takes up about half of the visual field when observed through a light microscope at 4x magnification?
 - e. Students observe a picture of a plate with different colonies on it. Based on the color of the colony, how many different kinds of organisms do you detect? Which type of organism are the most prevalent?

- f. From a given picture identify the organelle, its function, and state which type of microbe it is unique to.
 - g. What type of microbe is involved in the production of most breads?
 - h. What type of microbe is responsible for polio?
 - i. Based on the following graph, what will be the microbial population/ml after 3.5 hrs of growth?
 - j. Given Data, determine the minimum inhibitory concentration of an antibiotic.
 - k. Compare and contrast the given microbes based on their properties.
5. SCORING: Highest score will determine the winner. Selected questions may be used as tiebreakers.