MICROBE MISSION

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:**
   a. Participants must bring goggles.
   b. Each team may bring one 8.5" x 11" sheet of paper that may contain information on both sides in any form and from any source and two non-programmable, non-graphing calculators **dedicated to computation**.
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 types 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 & prepared slides are appropriate for all microbial types.
   d. The competition will cover all of the following topics and not emphasize just one area such as microbial disease. Disease questions will be restricted to the 2018 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. Identification 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, algae and **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. **Isolation of bacteria by streaking and serial dilution**
      x. **Division C only -** Gram stain uses and difference between $Gram^+$ & $Gram^-$
      xi. **Division C only -** Important aspects of spores & cysts
      xii. *Causes and effects of microbial population explosions*
      xiii. *Microbial competition **and communication***
      xiv. ***Microbiomes***
      xv. ***Biofilms***
   e. Measurements must be made to the precision of the device.
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 an alga.
   c. Based on the following graph, determine which organism is best suited for growth in acidic environment.
   d. **What is the approximate length of an organism that takes up about half of the visual field when observed through a light microscope at 400x 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 to which type of microbe it is unique.
   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 hours 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:** High score wins. Selected questions may be used as tiebreakers.