

presented
1/12/12

This competition will encompass knowledge of microbes, their characteristics, identification of life processes, and instrumentation used to view/understand them. The definition of a microbe, for our purposes, will be prions, virions, viruses, bacteria, protists, and members of the kingdom Fungi.

Below I have outlined areas I will focus on when selecting topics for testing. Some of these areas will require a general knowledge where others, an in depth understanding will be necessary.

Lastly, I will attempt to separate 'B' and 'C' topics, but generally 'B' will be basic understanding whereas 'C' will be more "in depth". On the day of competition, the testing will be set up in stations (approximately 10) with 5 minutes per station. These stations WILL be timed so each team has equal access to the questions.

1. Size comparison of various microbes
 - a. Virions
 - b. Prions
 - c. Viruses
 - d. Bacteria
 - e. Fungi (single cell)
 - f. Protists
2. Types of microscopes with their uses, attributes and limitations
3. Parts of the light microscope (ID from photos and the physical microscope. (if a scope is used, it will be a stereoscopic with adjustable stage)
4. Estimate size of a microscopic organism using the field of view on a compound light microscope. (this is the formula for determining field of view. 100x is the magnification under low power and 1.83mm is the diameter. The "?" represents the total magnification the microscope is set at which you are viewing whatever.)

$$\text{Field of View} = \frac{100x}{?} \times 1.83 \text{ mm}$$

5. Identify various Protists and their organelles from photomicrographs or models
 - a. Euglena
 - b. Paramecium
 - c. Amoeba

6. Identify the organelles of a prototypical cell (plant and animal) From an illustration, photomicrograph or model
7. Identify from an illustration, the components of a Virus and be able to discuss the difference between lytic and lysogenic cycles
8. Classification of microbes beginning with "Domain" and through Kingdom and what evidentiary characteristics are significant about each
9. Characteristics of bacteria:
 - a. shapes
 - b. energy sources (photo, chemo, hetero/auto etc)
 - c. sporulation
 - d. Gram + and -, and be able to identify the differences in their individual cell walls
 - e. Plasmids
 - f. Transformation, transduction, conjugation
 - g. episome
10. Characteristics of the Domain Archea
 - a. Types of extremophiles
11. Viruses
 - a. Vectors
 - b. Host range
 - c. Vaccine
 - d. Innocuation
 - e. Bacteriophage
 - f. Provirus
12. Microbes in the Nitrogen, Carbon and Phosphorus cycles
13. Endosymbiont Theory
14. Transgenic organisms
15. Red Tide.
 - a. microbes involved
 - b. effects on filter feeders
 - c. causes of blooms
16. Identification of diatoms

17. Structure and classification of:

- a. Typical fungus (such as black bread mold)
- b. Virus
- c. bacteria

18.Examples of:

- a. Pathogenic Bacteria
- b. Pathogenic Fungi
- c. Pathogenic Protozoans
- d. Viral diseases
- e. Prions
- f. Virions

19.Examples of:

- a.Beneficial Bacteria
 - In human digestion
 - Ecological cycles
 - Waste management
 - Food industry
 - Antibiotics (also with fungi)

20.Explain with examples, Recombinant DNA, Genetic Engineering and Biotechnology

21.Koch's postulates

22.Endotoxins and Exotoxins

23.Explain Exponential and logistical growth curves and what is occurring in this curve

24.