

# Microbe Mission C Test

Science Olympiad North Regional  
Tournament at the University of Florida

Rank: \_\_\_\_\_

Points: \_\_\_\_\_



Name(s): \_\_\_\_\_

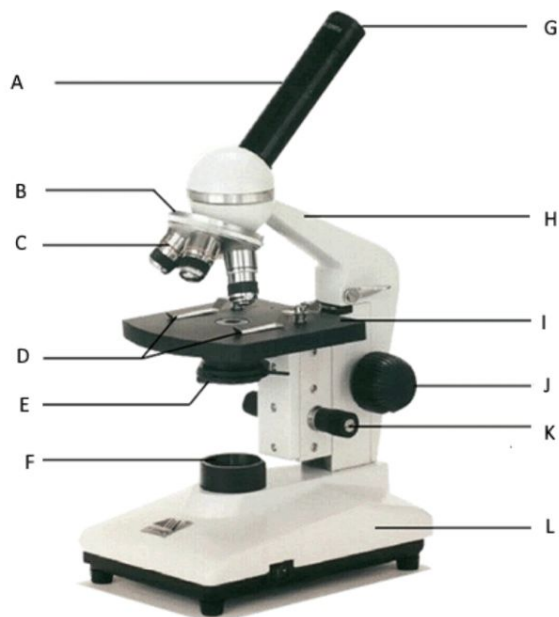
Team Name: \_\_\_\_\_

School Name: \_\_\_\_\_

Team Number: \_\_\_\_\_

## Part 1: Microscopes

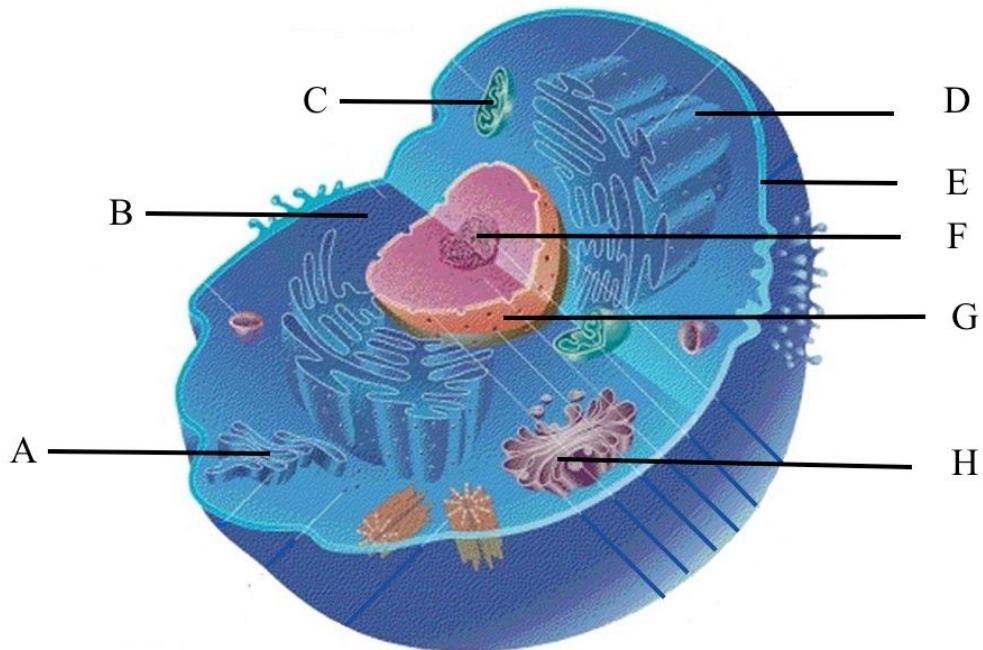
Names the following structures (A-L) its function (12 points, 0.5 point identification, 0.5 point function):



A.	B.
C.	D.
E.	F.
G.	H.
I.	J.
K.	L.

## Part 2: Microbial Structures

Identify the following structures and functions of the eukaryotic cell (8 points):



A.	B.
C.	D.
E.	F.
G.	H.

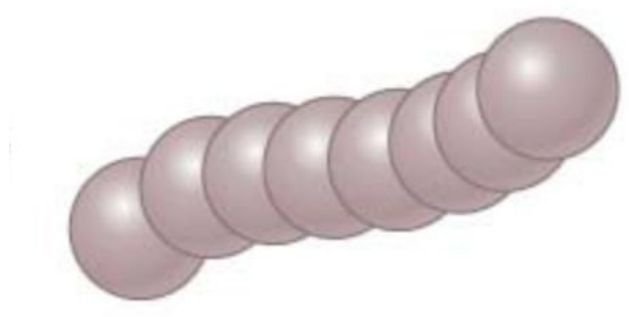
### Part 3: Microbial Shape

Name the bacterial shape and its arrangements (11 points, 1 point for each correct answer):

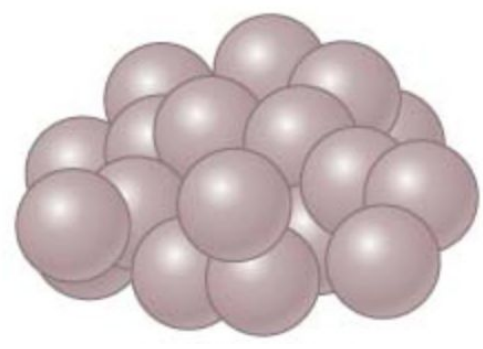
**General Shape:** \_\_\_\_\_



Arrangement name: \_\_\_\_\_



Arrangement name: \_\_\_\_\_



Arrangement name: \_\_\_\_\_

General Shape: \_\_\_\_\_



Arrangement name: \_\_\_\_\_



Arrangement name: \_\_\_\_\_

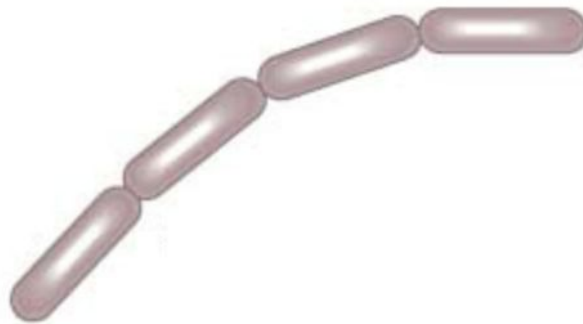
General Shape: \_\_\_\_\_



Arrangement name: \_\_\_\_\_



Arrangement name: \_\_\_\_\_

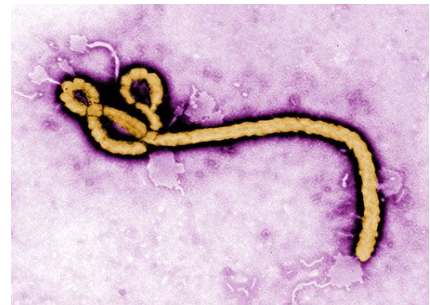


Arrangement name: \_\_\_\_\_

## Part 4: Microbial Diseases

Answer the following multiple choice questions:

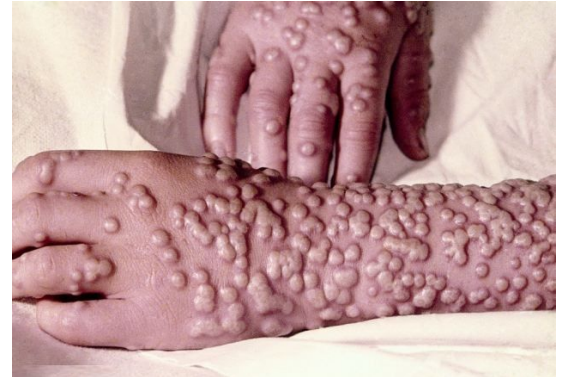
1. Which of the following virus is a retrovirus? (1 point)
  - a. Human Immunodeficiency Virus
  - b. Human Papillomavirus
  - c. *Pseudomonas aeruginosa*
  - d. Epstein-Barr Virus
2. The microbe shown at the right would most likely cause which disease? (1 point)
  - a. West Nile Virus
  - b. Hepatitis B
  - c. Ebola
  - d. Gonorrhea



3. Identify the disease that is transmitted by a mosquito and is also called *Breakbone fever*? (1 point)
  - a. Yellow Fever
  - b. Dengue Fever
  - c. Malaria
  - d. West Nile Virus
4. Which infectious bacterial disease characterized by the growth of nodules (tubercles) in the tissues, especially the lungs? (1 point)
  - a. Cystic fibrosis
  - b. Bronchitis
  - c. Pneumonia
  - d. Tuberculosis
5. Syphilis is a sexually transmitted infection caused by which bacteria? (1 point)
  - a. *Pseudomonas fluorescens*
  - b. *Treponema pallidum*
  - c. *Streptococcus agalactiae*
  - d. *Escherichia coli*

6. To decontaminate a building from anthrax spores, which of the following can be used? (1 point)
- X-ray radiation
  - Lasers
  - Industrial building cleaners
  - Chlorine dioxide gas

7. Identify the disease in the picture on the right? (1 point)
- Scabies
  - Herpes simplex
  - Smallpox
  - Impetigo

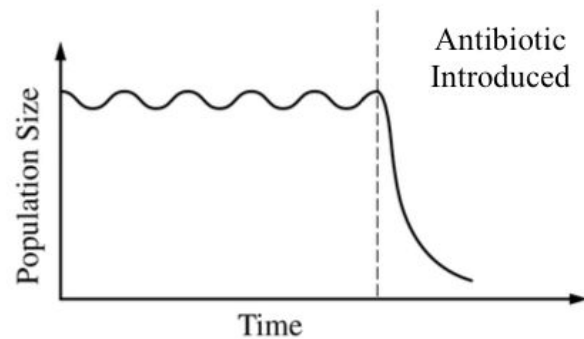


8. Chlamydia is caused by which of the following? (1 point)
- C. burnetii*
  - C. difficile*
  - C. trachomatis*
  - C. tetani*
9. Which of the following infection used penicillins its treatments? (1 point)
- Dysphagia
  - Strep throat
  - Histoplasmosis
  - Trichinosis
10. Which disease caused by the same virus causes chickenpox and results painful blisters to the patient? (1 point)
- Shingles
  - Melanoma
  - Psoriasis
  - Hyperhidrosis



## Part 5: Microbial Organism

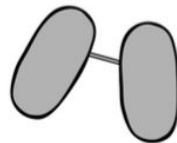
Answer the following multiple choice questions:



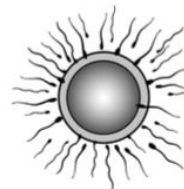
1. The graph above shows the size of a population of a certain organism that is grown in a petri dish. The population was affected once the scientist introduced a new type of antibiotic at the time indicated on the graph. Which is the following best predict how the population will be affected by the landslide? (2 points)
  - a. The surviving organism will evolve into a new species
  - b. The reduced population will likely have allelic frequencies that are different from the initial population
  - c. The reduced population will have a greater number of different genes than the initial population
  - d. The population stays the same



Crossing Over

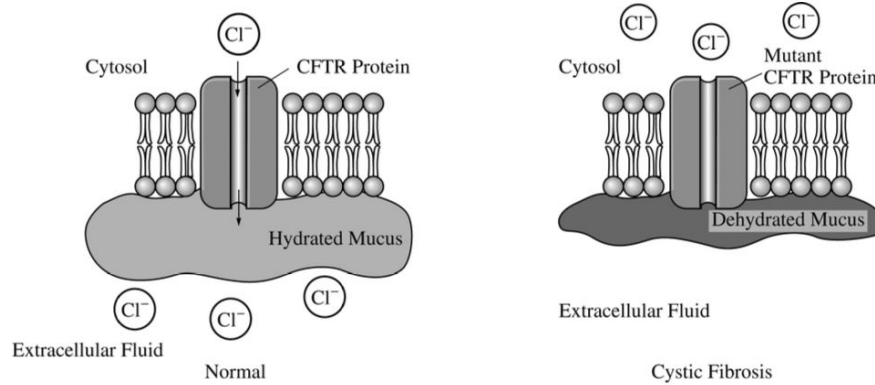


Conjugation



Fertilization

2. The processes illustrated in the model depicted above all result in which of the following? (2 points)
  - a. Transcription
  - b. An increase in genetic variation
  - c. An increase in the chromosomes number
  - d. Horizontal gene transfer



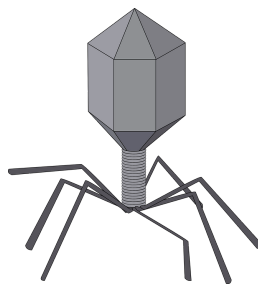
3. Cystic fibrosis is a recessively inherited disorder that results from a mutation in the gene encoding CFTR chloride ion channels located on the surface of many epithelial cells. As shown in the figure, the mutation prevents the normal movement of chloride ions from the cytosol of the cell to the extracellular fluid. As a consequence of the mutation, the mucus layer that is normally present on the surface of the cells becomes exceptionally dehydrated and viscous.

An answer to which of the following questions would provide the most information about the association between the CFTR mutation and the viscous mucus? (2 points)

- Is the mucus also secreted from the cells through the CFTR proteins?
- How does the disrupted chloride movement affect the movement of sodium ions and water by the cell?
- How does the mutation alter the structure of the CFTR proteins?
- What is the change in nucleotide sequence that results in the CFTR mutation?

4. What are two of the most important eukaryotic features that evolved in protists?(2 points)
- Pseudopodia and cilia
  - Photosynthesis and silica shells
  - Multicellularity and sexual reproduction
  - Spores and microtubules
5. Which of the following is not a human disease caused by a protist? (2 points)
- Giardiasis
  - Paralytic Shellfish Poisoning
  - Cryptosporidiosis
  - Dengue fever

6. Algae are (2 points)
- Usually heterotrophic
  - Always microscopic in size
  - Found in fresh water, salt water, and damp soil
  - Found only in fresh water
7. During the preparation of food, \_\_\_\_\_ is the movement of harmful microorganisms from one surface to another. (2 points)
- Contamination
  - Sanitation
  - Homogenization
  - Cross-contamination
8. Food Safety is monitored by (2 points)
- USDA
  - EPA
  - FDA
  - CDC
9. Which organism is considered obligatory intracellular parasites? (2 points)
- Prions
  - Archaea
  - Bacteria
  - Viruses
10. Which organism cause diseases that are the result of an altered protein? (2 points)
- Protozoa
  - Algae
  - Prion
  - Viruses



11. What is the name of the microbe show above? (2 points)
- Virus
  - Bacteriophage
  - Bacteria
  - Protozoa

12. Which of the following terms apply to the paramecium? (2 points)
- Fungus
  - Protozoan
  - Prokaryote
  - Archaea
13. Which of the following disease is NOT caused by a bacterium (2 points)
- Anthrax
  - Tuberculosis
  - Influenza
  - Lyme disease
14. Bacteria that cause botulism may survive in canned food for a long time because? (2 points)
- The bacteria may form endospores
  - The can was left open
  - Some cans may contain viruses that protect the bacteria
  - Sterilized can do not have enough oxygen to harm the bacteria
15. Which microorganism can survive sterilization? (2 points)
- Bacteria
  - Algae
  - Fungi
  - Endospores

## Part 6: Gram Stain

Focus the two provided microscope and answer the following questions:

1. Why is it important to distinguish between Gram-positive and Gram-negative bacteria in diagnosing a bacterial infection? (3 points)

---

---

---

---

---

---

---

---

2. Which labeled microscope is Gram-negative? How do you know? (2 points)

---

---

---

3. Which labeled microscope is Gram-positive? How do you know? (2 points)

---

---

---

4. Identify the shape of the microbe is shown under microscope A (1 point)

---

5. Identify the shape of the microbe is shown under microscope B (1 point)

---

## Part 7: Tiebreaker

1. A student washes his hands and leaves 100 bacterial cells on a new bar of soap. After 24 hours he decides to do a plate count and dilutes 1g of the soap 1:10<sup>9</sup> and plate it on a standard plate count agar. After 24 hours of incubation there are 551 colonies counted. How many bacteria were on the soap sample? Show your work, answer can be written in scientific notation form (1 point for correct answer, 1 point for showing the work) (2 points)

---

---

---

---

---

---

---

---

2. Why are drug cocktails used in the treatment of HIV? (2 points)

---

---

---

---

---

---

---

---

3. Give two pieces of evidences that support the origin of microbes (2 points)

---

---

---

---