

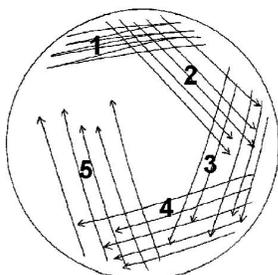
Microbe Mission Key

1. Bacteria, Archaea, Eukaryota (3 pt total)
2. List 2 (2 pt total)
 - a. Has a membrane that separates the cell from the outside world
 - b. Contains a nucleic acid as its genetic material (DNA or RNA)
 - c. Use their genetic material to produce protein – structural or functional as enzymes and hormones
 - d. Are composed of basic chemical as carbohydrates, proteins, fats, nucleic acids, vitamins, & minerals
 - e. Regulate the flow of nutrients and wastes entering and leaving the cell
 - f. Reproduce and are the result of reproduction
 - g. Require a source of energy
 - h. Interact with their environment
3. 1/2 point for name - 1/2 point for description (2 pt total)
 - a. Virus: nucleic acid surrounded by protein capsid
 - b. Prion: misfolded protein
 - c. Viroid: short strands of circular, single-stranded RNA w/o protein coats
4. 1 point for definition, 1 point for each piece of evidence (up to 3) (4 pt total)
 - a. The mitochondria and chloroplast were free-living prokaryotes that became incorporated into eukaryotes.
 - b. Evidence: mitochondria and chloroplasts divide through binary fission, not mitosis like the rest of the cell. These organelles, which are the same size as bacteria, also have their own different, circular DNA, their own ribosomes and two membranes. The two membranes have different chemical compositions, with the outer being similar to the eukaryotic plasma membrane and the inner being similar to bacterial membranes. Chloroplasts in some algae have cell walls of peptidoglycan
5. (4 pt total)
 - a. Prion disease (1pt) OR a group of progressive conditions that affect the brain and nervous systems of many animals
 - b. A misfolded protein that can trigger normal proteins in the brain to fold abnormally
 - c. Examples:
 - i. Creutzfeldt-Jakob disease (CJD)
 - ii. Bovine spongiform encephalopathy (BSE) / Mad Cow Disease
 - iii. Kuru
 - iv. Fatal Familial Insomnia (FFI)
 - v. Gerstmann-Sträussler-Scheinker disease (GSS)
 - vi. Scrapie
6. One point for distinction, one point for test (3 pt total)
 - a. Gram negative bacteria have a thin peptidoglycan layer (1pt), while gram positive bacteria have many thick layers (1pt).
 - b. Gram Staining
7. Common cold (do not accept 'infection') (1 pt total)
8. coccus (spherical), bacillus (rod-shaped), and spiral (twisted) (3 pt total)
9. 1 pt definition - 1 pt difference (2 pt total)

- a. Small infection pathogen that consists of short strands of circular, single-stranded RNA w/o protein coats
 - b. Viruses have protein coats OR Viruses may have DNA (do not accept viruses do not have RNA)
10. the flu virus forms a hard coating that acts like an envelope, helping the virus spread (2 pts total) through cold air and then melting inside people
11. ½ point for correct number, ½ point for units (2 pt total)
- a. 1000 micrometers (µm or mcm) = 1 millimeter (mm)
 - b. 1000 nanometers (nm) = 1 micrometer (mcm)
12. 1/2pt liquid - 1/2pt purpose (4 pt total)

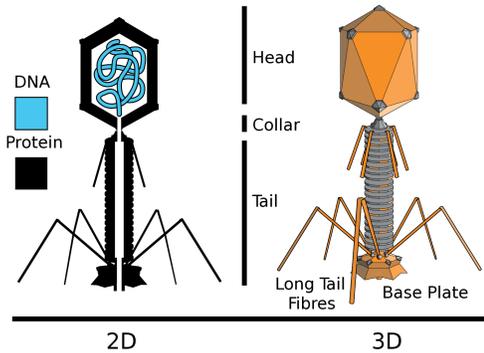
Step	Microscopic Appearance of Cell		Chemical Reaction in Cell Wall (very magnified view)	
	Gram (+)	Gram (-)	Gram (+)	Gram (-)
1. Crystal violet First, crystal violet is added to the cells in a smear. It stains them all the same purple color.				
2. Gram's iodine Then, the mordant, Gram's iodine, is added. This is a stabilizer that causes the dye to form large complexes in the peptidoglycan meshwork of the cell wall. The thicker gram-positive cell walls are able to more firmly trap the large complexes than those of the gram-negative cells.				
3. Alcohol Application of alcohol dissolves lipids in the outer membrane and removes the dye from the peptidoglycan layer—only in the gram-negative cells.				
4. Safranin (red dye) Because gram-negative bacteria are colorless after decolorization, their presence is demonstrated by applying the counterstain safranin in the final step.				

13. Thermophilic bacteria (1pt); Lower Geyser Basin of Yellowstone National Park (1pt) (2 pt total)
14. Methionine (1 pt total)
15. The glycocalyx (1 pt total)
16. See point guidelines below (6 pt total)
- a. Easily removable, unorganized layer of extracellular material (1pt) that surrounds bacteria cells (1pt) OR easily removed sugar coat (1pt) of bacteria (1pt)
 - b. Exopolysaccharides, glycoproteins, glycolipids (1 pt each)
 - c. Centrifugation (1pt)
17. Dark and greenish (1 pt total)
18. Gamma hemolysis (γ-hemolysis) (1 pt total)
19. Complete hemolysis: a complete lysis of red blood cells (1 pt total)
20. TATA Box (1 pt total)
21. Eukarya & Archae - half point each (1 pt total)
22. Indole test (1 pt total)
23. (Numbers not required, need at least 3 passes) (1 pt total)



24. Spirillum (1 pt total)
 25. Endospore (1 pt total)
 26. (3 pt total)

Include head (1/2pt), collar (1/2pt), tail + tail fibres (1/2pt), base plate (1/2pt), DNA (1/2pt), protein (1/2pt)



27. 1 pt each (4 pt total)
- Polar/Monotrichous
 - Lophotrichous
 - Amphitrichous
 - Peritrichous

28. ½ point microbe type, ½ point size (14 pt total)

Name	Type of Microbe	Size (µm)
Amoeba	Protozoa	500µm
Diatoms	Algae	200µm
Cyanobacteria	Bacteria	1µm
Euglena	Protozoa	130µm
E. Coli	Bacteria	2µm
Rhinovirus	Virus	0.03µm
Lactobacillus	Bacteria	2µm
Staphylococcus	Bacteria	1µm
Smallpox	Virus	0.3µm
Paramecium	Protozoa	250µm
Rabies	Virus	0.15µm
Influenza	Virus	0.10µm
Polio	Virus	0.03µm
Yeast	Fungi	1µm