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 through cold air and then melting inside people (2 pts total)

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)

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. 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)
   a. Polar/Monotrichous
   b. Lophotrichous
   c. Amphitrichous
   d. Peritrichous

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Type of Microbe</th>
<th>Size (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoeba</td>
<td>Protozoa</td>
<td>500μm</td>
</tr>
<tr>
<td>Diatoms</td>
<td>Algae</td>
<td>200μm</td>
</tr>
<tr>
<td>Cyanobacteria</td>
<td>Bacteria</td>
<td>1μm</td>
</tr>
<tr>
<td>Euglena</td>
<td>Protozoa</td>
<td>130μm</td>
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<tr>
<td>E. Coli</td>
<td>Bacteria</td>
<td>2μm</td>
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<tr>
<td>Rhinovirus</td>
<td>Virus</td>
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</tr>
<tr>
<td>Lactobacillus</td>
<td>Bacteria</td>
<td>2μm</td>
</tr>
<tr>
<td>Staphylococcus</td>
<td>Bacteria</td>
<td>1μm</td>
</tr>
<tr>
<td>Smallpox</td>
<td>Virus</td>
<td>0.3μm</td>
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<tr>
<td>Paramecium</td>
<td>Protozoa</td>
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<tr>
<td>Rabies</td>
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<tr>
<td>Influenza</td>
<td>Virus</td>
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<tr>
<td>Polio</td>
<td>Virus</td>
<td>0.03μm</td>
</tr>
<tr>
<td>Yeast</td>
<td>Fungi</td>
<td>1μm</td>
</tr>
</tbody>
</table>