MICROBE MISSION - SAMPLE TOURNAMENT #1
by Karen L. Lancour

STATION A: MICROSCOPY

1. A microscope has an **10 objective and oculars of 4X, 10X, 40X and 100X.** What is the range of magnification for this microscope. (lowest to highest)

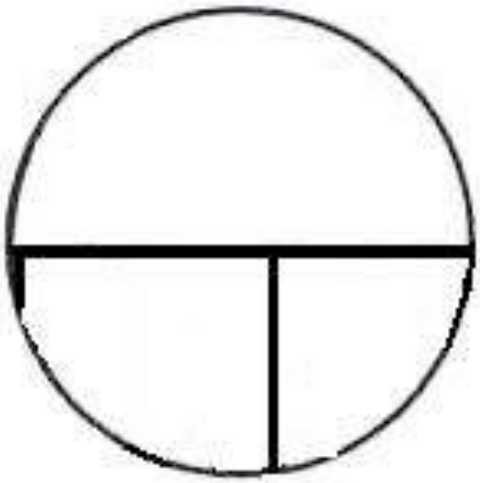
2. A student prepares a slide with the letters **"GR"** and positions it on the stage in the normal reading position. When viewed, how will the **"GR "** will appear? Draw it on your answer sheet.

3. Examine the **diagram** of **the stage with the millimeter ruler** from a **10X objective**. What is the diameter of this field of view in millimeters? in micrometers or mcm?

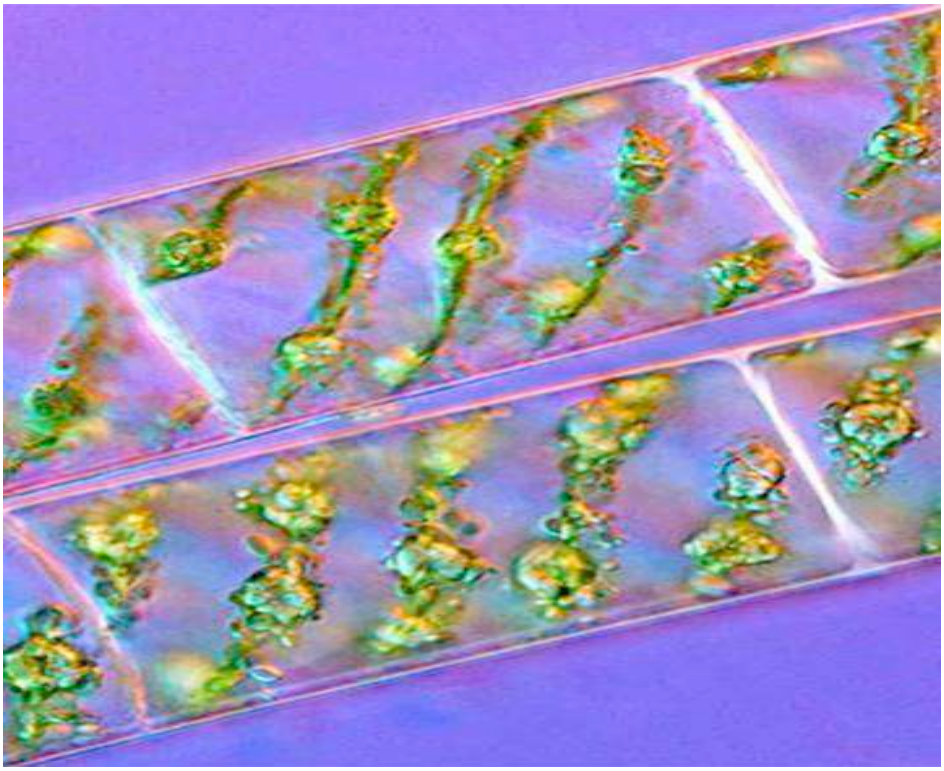
4. What would be the diameter of the **40X field of view** based upon diameter of the 10X objective from question # 5 in millimeters? in micrometers or mcm? **(Remember: it must be calculated using the information from question # 4 and the ratio of magnification because it is less than one mm)**

5. Examine the **Photo of *Spirogyra***. Assume that the length of the photo is the same as the diameter of the 40X field of view calculated in question 5, what is the length of the of a cell in **micrometers or mcm**?

STATION A: MICROSCOPY



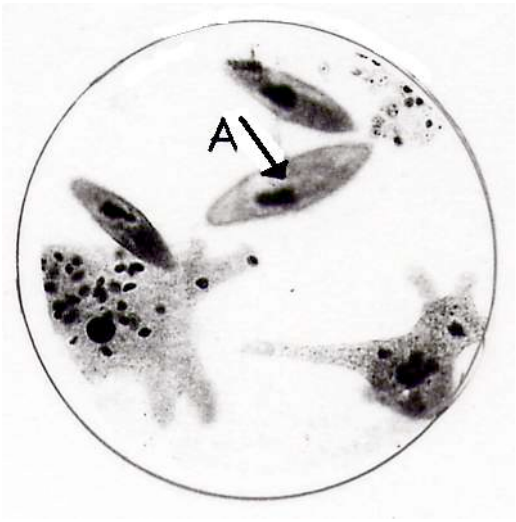
Stage with millimeter ruler (10X objective)

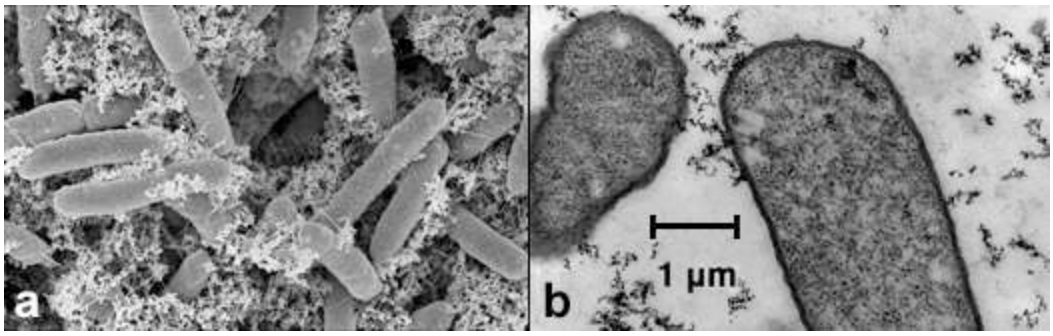


Spirogyra **(40X objective)**

STATION B: MICROSCOPE IMAGES

Light microscope





Electron Micrographs

6. Organism A is being observed under a light microscope – its length is about 125 mcm. What is the diameter of this field of view? Under what power is it being observed? (scanning power, low power, high power, or oil immersion?)

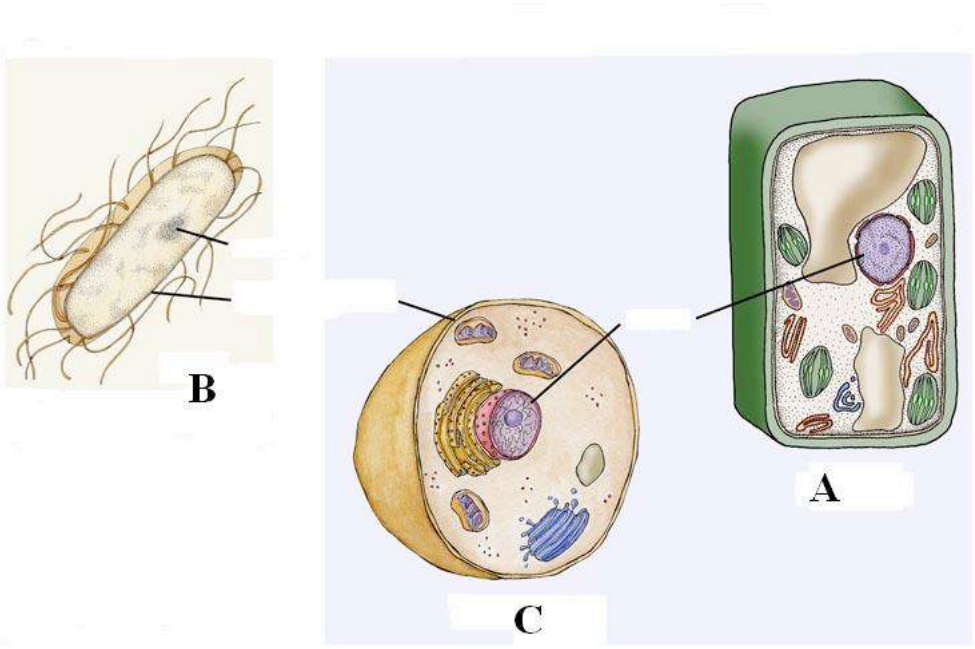
7. How would you determine the third dimension of the organism on the slide?

8. Which micrograph **(A or B)** is from a **scanning electron microscope**? How do you know?

9. Which diagram **(A or B)** is from **a transmission electron microscope?** How do you know?

10. What is the **approximate diameter of the microbes in** the micrograph labeled **B?**

STATION C: TYPES OF CELLS



11. Which cells (A, B, and/or C) are prokaryotic? How can you tell?

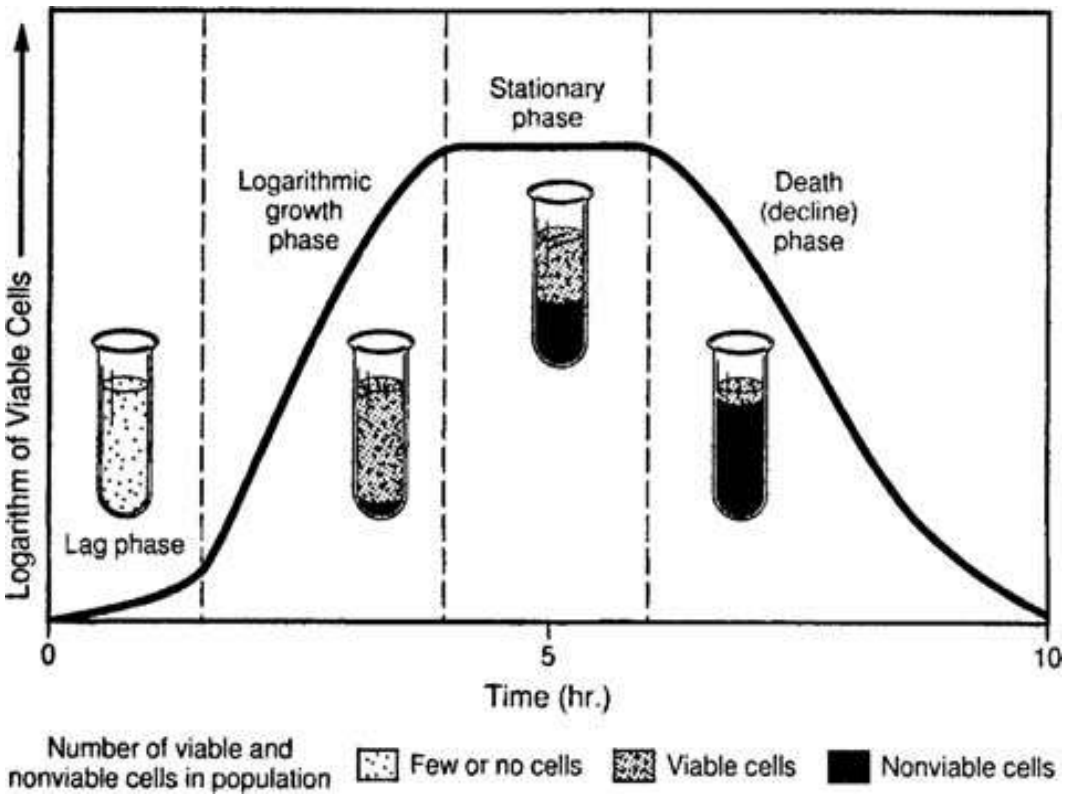
12. Which types of microbes are prokaryotic? (viruses, bacteria, Archea, algae, protozoa, fungi)

13. Which cells (A, B, and/or C) are eukaryotic? How can you tell?

14. Which types of microbes are eukaryotic? (viruses, bacteria, Archea, algae, protozoa, fungi)

15. Which structures are present in cell A that are not present in cell C ?

STATION D: GROWTH CURVE



16. What is the difference between viable and nonviable cells?

17. What is happening during the lag phase where there is little growth?

18. What is happening during the logarithmic growth phase?

19. What is happening during the stationary phase**?**

20. What is happening during the death (decline) phase and why is it happening?

STATION E: DICHOTOMOUS KEY

Use the dichotomous key to identify microbes A-E.

21. Identify specimen A.

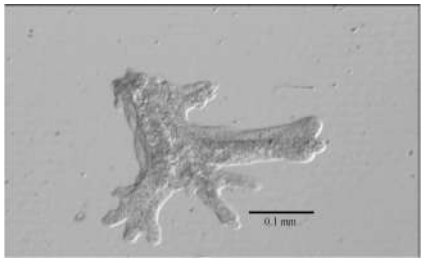
22. Identify specimen B.

23. Identify specimen C.

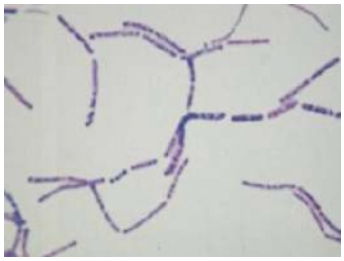
24. Identify specimen D.

25. Identify specimen E.

STATION E: DICHOTOMOUS KEY

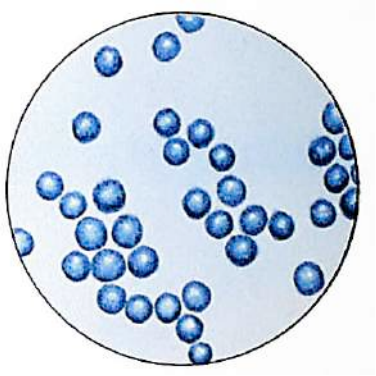


A

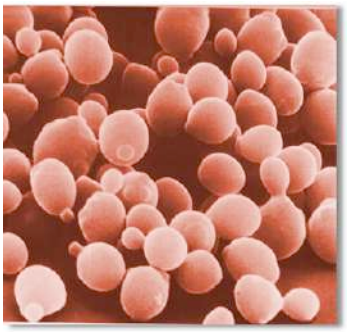


B

C



D



E

Photo's are not to scale

MICROBE KEY

1. **Spherical or elliptical in shape . . . . . .3.**
1. **Not spherical or elliptical in shape . . . . . .2.**

2. **Irregular shaped with extending arm-like structures . . . . . ameboid protozoan**
2. **Rod shaped – many linked together . . . . . bacillus bacteria**

3. **Has green chlorophyll and flagella . . . . . *Clamydomonas***
3. **Not chlorophyll or flagella . . . . . .4.**

4. **Spheres have small buds attached . . . . . Baker's yeast**
4. **Spheres without buds . . . . . coccus bacteria**

STATION F: YEAST EXPERIMENT

Students performed the yeast experiment using the materials listed below:

- 1 packet of active dry yeast
- 1 cup very warm water (105° F–115° F)
- 2 tablespoons sugar
- a large rubber balloon
- a small (1-pint to 1-liter) empty water bottle

Answer the following questions:

26. What type of organism is the yeast? (algae, protozoan, fungi., bacteria, virus)

27. With the balloon over the jar – what type of environment does the yeast have? (aerobic or anaerobic)

28. What gas is being collected in the balloon?

29. What other waste product does the yeast make while breaking down sugar for energy? What is the name of this type of respiration?

30. What are some of the commercial uses for this type of yeast?

STATION G: MICROBES IN ECOLOGY

Indicate whether the following statements are true or false.

31. Lichens is a symbiotic relationship between an algae or cyanobacteria and a fungus.

32. Certain microbes can break up and eat oil while others can produce petroleum.

33. Viruses are considered living organisms and are found wherever there is a cell to invade.

34. Bacteria and fungi are important as decomposers.

35. In a teaspoon of topsoil there are a billion bacteria and 120,000 microscopic fungi.

STATION H: DISEASES BY MICROBES

Use the key for "Type of Microbe" to answer questions 36-40.

Type of microbe

A. virus
B. bacteria
C. protozoan
D. fungus

36. Which type of microbe causes Malaria?

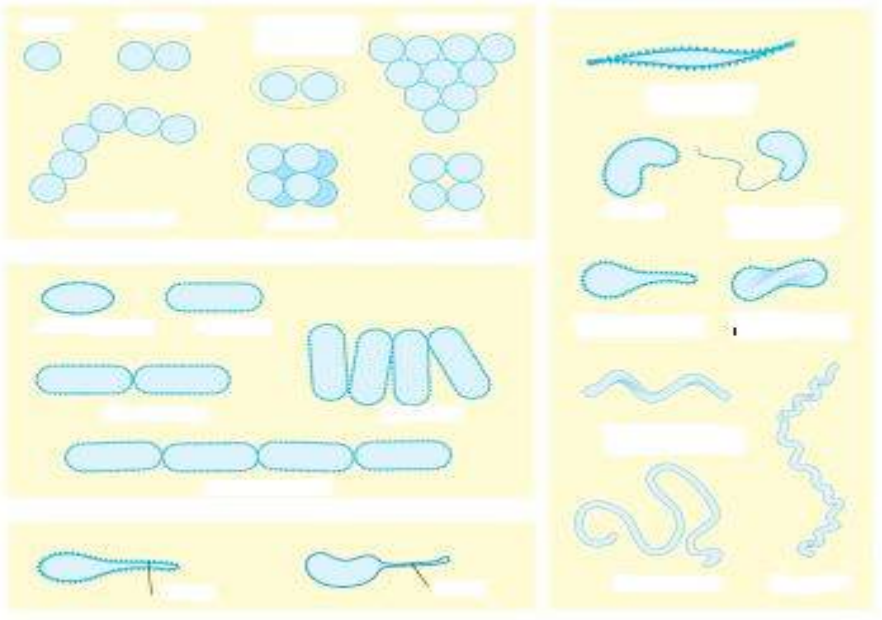
37. Which type of microbe causes Athlete's foot?

38. Which type of microbe causes H1N1 influenza?

39. Which type of microbe causes strep throat?

40. For which type of microbe is an antibiotic an effective treatment**?**

STATION I: BACTERIAL SHAPES (Division C)



41. Which type of bacteria are rod shaped? A chain of rods is called what?

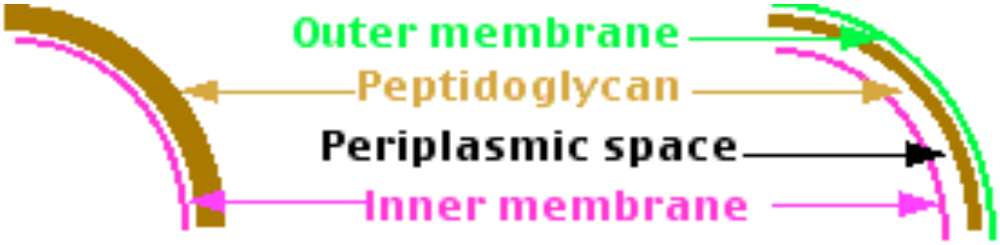
42. What type of bacteria are spherical shaped? Two spheres together is called?

43. Spirochetes are what shaped? (comma, spiral, filaments, club)

44. Vibro is what shaped? (comma, spiral, filaments, club)

45. An oval shaped bacterium is termed what?

STATION J: GRAM + VS. GRAM – BACTERIA (Division C)



A. **B.**

46. Which cell wall (A or B) is from a gram – bacterium?

47. What color will it appear when the gram stain process is completed?

48. Which cell wall (A or B) is from a gram + bacterium?

49. What color will it appear when the gram stain process is completed?

50. Which type of bacteria (Gram + or Gram -) produce endotoxins as Salmonella?

MICROBE MISSION - SAMPLE - *ANSWER KEY*

STATION A: MICROSCOPY

1. **40X to 1000X**
2. **GR is upside down and backwards or inverted and reversed**
3. **~1.6 mm ~ 1600 micrometers**
4. **~400 mcm**
5. **~ 300 mcm**

STATION B: MICROSCOPE IMAGES

6. **~ 400 mcm high power**
7. **focus up and down through it**
8. **A - because it is 3-dimensional**
9. **B - because it is 2-dimensional**
10. **~ 2 micrometers**

STATION C: TYPES OF CELLS

11. **B – lacks organized membrane-bound nucleus or membrane-bound organelles**
12. **bacteria and Archaea**
13. **A & C - organized membrane-bound nucleus or membrane-bound organelles**
14. **algae, fungi, protozoa**
15. **cell wall and chloroplasts**

STATION D: GROWTH CURVE

16. **viable cells are living and nonviable cells are dead**
17. **cells are growing and producing materials needed to reproduce**
18. **binary fission – cells numbers are doubling each generation – logarithmic increases in numbers**
19. **equal numbers are reproducing and dying so numbers stay steady**
20. **many cells are dying – limited food and build up of cellular wastes**

STATION E: DICHOTOMOUS KEY

21. **ameboid protozoan**
22. **bacillus bacteria**
23. ***Clamydomonas* – " a single celled green algae"**
24. **coccus bacteria**
25. **Baker's yeast**

STATION F: YEAST EXPERIMENT

26. **fungi**
27. **anaerobic – without oxygen**
28. **carbon dioxide**
29. **ethyl alcohol – fermentation**
30. **Making bread products (carbon dioxide make dough rise) or making alcohol products as beer or wine**

MICROBE MISSION - SAMPLE - *ANSWER KEY*

STATION G: MICROBES IN ECOLOGY

31. true - an important food source and producer in the tundra
32. true - bacteria eat oil and algae produce petroleum
33. false – because viruses are acellular – otherwise true
34. true - important for decay
35. true - essential for nutrient or recycling of matter in the ecosystem

STATION H: DISEASES BY MICROBES

36. C (protozoan)
37. D (fungus)
38. A (virus)
39. B (bacteria)
40. B (bacteria)

STATION I: BACTERIAL SHAPES (DIV. C)

41. bacillus streptobacilllus
42. coccus (cocci) diplococcus
43. spiral
44. comma
45. cocco-bacillus

STATION J: GRAM + vs. GRAM – BACTERIA (DIV. C)

46. B is gram negative
47. red
48. A is gram positive
49. purple
50. gram negative