Twin Tiers Invitational
Athens, PA

MICROBE MISSION TEST

Use the following information to answer #1-5.

A student was observing a microbial sample in a Petri dish. This is what it looks like under a microscope (Fig. 1).

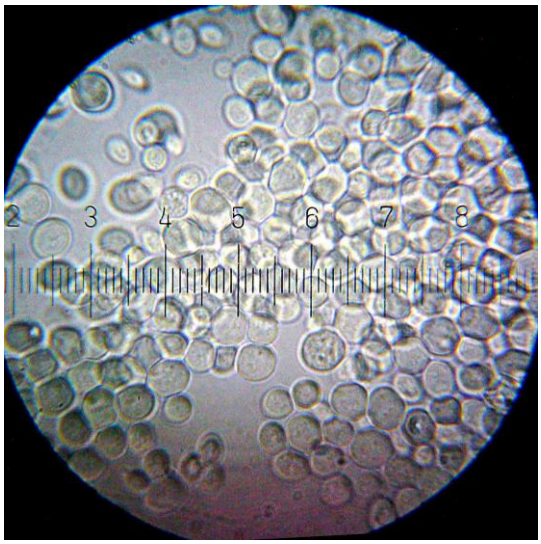


Figure 1.

The student also created a table showing the growth of the microbe over time.

Time	Number of microbes
0 minutes	30
5 minutes	150
10 minutes	750
15 minutes	3750

1. The microscope above shows a sample of what?
    a. diatoms
    b. yeast
    c. lichens
    d. algae
    e. ciliates

2. If the student constructed a graph of the information in the table, what would be the manipulated variable?
    a. sample used
    b. time
    c. number of microbes
    d. concentration
    e. size

3. Is the data in the table an example of an ***arithmetic sequence*** or ***geometric sequence***?

4. If the trend continues, how many microbes will there be in the Petri dish in **25 minutes**?

5. What type of microbe is the sample in the microscope? _____

***Use figure 2 to answer questions #6-10.**

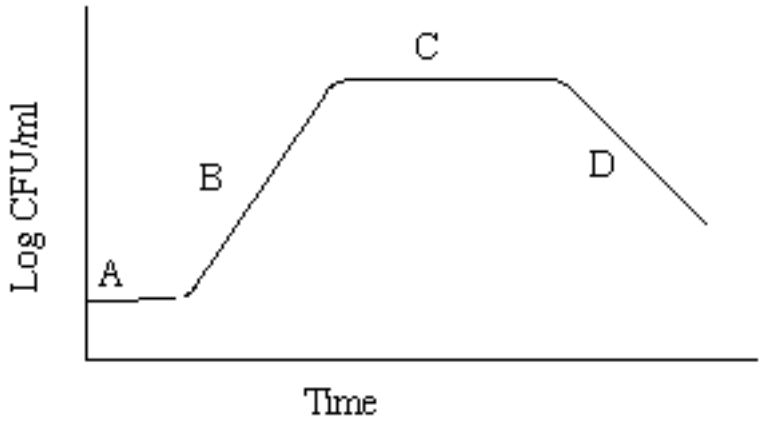


Figure 2.

6. What type of microbe growth is shown above?
   a. continuous culture
   b. open culture
   c. semi-continuous culture
   d. closed culture

7. What is **"A"** called in the microbial growth shown in figure 2?

8. What is **"B"** called in the microbial growth shown in figure 2?

9. What is **"C"** called in the microbial growth shown in figure 2?

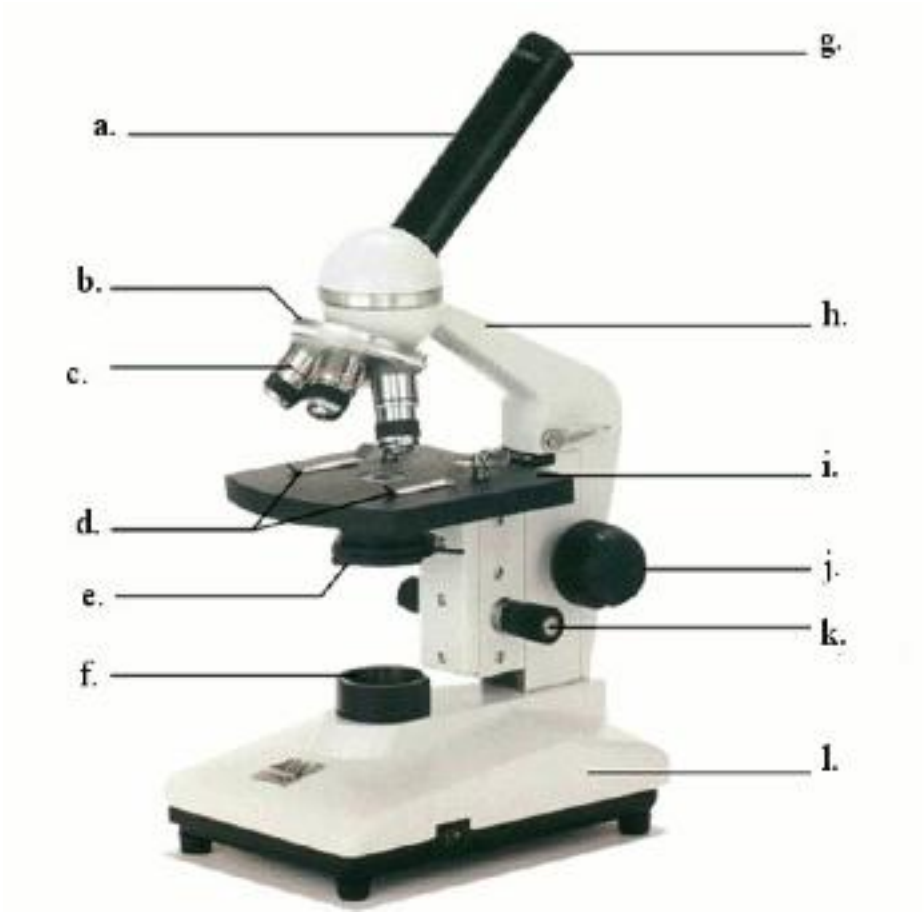
10. What is **"D"** called in the microbial growth shown in figure 2?

Matching: Match the disease with the type of pathogen that produces it.

A. Bacterial B.Viral C. Fungal D. Protozoan E. Prion

11. Mumps
12. Botulism
13. Tetanus
14. Thrush
15. Yellow Fever
16. Malaria
17. Dental Caries
18. Strep Throat
19. Ebola
20. Ebola
21. Peptic Ulcer
22. Mad Cow Disease
23. Ringworm
24. Chlamydiasis

***Use figure 3 to answer questions #25-28.**



25. What kind of microscope is this?

26. Identify the letter that represents the diaphragm.

27. Identify which letter represents the fine adjustment.

28. Which letter(s) is/are involved in determining total magnification?

29. What are the 2 cycles a virus could follow in a host?

30. Choose which of the following are plausible symptoms of legionellosis. You may circle more than one answer.

a. dry cough
b. intestinal disorders
c. anemia
d. vomiting

31. When centrioles are destroyed by hypothetical microbes in an animal cell, what function is essentially terminated?

a. ATP production

b. metabolism of sugars
c. endocytosis
d. mitosis

32. Which of the following statements BEST describes the Endosymbiotic Theory?
a. prokaryotic cells evolved from specialized eukaryotes living inside one another.
b. viruses evolved from protein-infectious particles.
c. eukaryotic cells evolved from specialized prokaryotes living inside one another.
d. eukaryotic cells evolved when infoldings of the plasma membrane engulfed bacteria.

33. A group of spherical bacteria which occurs in a chain is called
a. sarcina
b. streptococci
c. staphylococci
d. diplococci

34. Lichens are a symbiotic association between a photosynthetic organism and a
a. fungus
b. virus
c. protozoan
d. bacterium

* Put these in order from largest to smallest:

35. ___
36. ___
37. ___
38. ___
39. ___
40. ___
41. ___
42. ___

e. red blood cell
f. amoeba
g. E. coli
h. carbon atom
i. rhinovirus
j. paramecium
k. yeast
l. phage

43. Genetic variation among bacterial populations may result from all of the following processes except
a. transduction
b. mutation
c. meiosis
d. conjugation

44. You discover something green and fuzzy on some food that has been in the refrigerator for a long time. This organism is most likely a(n)
a. Archeae
b. bacterium
c. alga
d. fungus

45. A scientist discovers some cells underneath the surface of Antarctica. This organism is most likely a(n)

a. Archeae
b. virus
c. alga
d. fungus

46. Which of the following groups of organisms represent the main decomposers in the soil?

a. bacteria and viruses
b. bacteria and fungi
c. fungi and viruses
d. algae and fungi

47. NASA scientist have recently reported that they have isolated an organism from a lake in California. The lake has a 10% salt concentration (the oceans are about 3% salt) and a pH of 10. What is the most likely type of organism isolated?

a. Fungus b. Archeae c. Eubacteria d. Plant like protist(alga)

***Match the human body system that is typically affected by the following diseases. Some answers may be used more than once; others not all. Each disease will have only 1 answer.**

Disease	**Body System**
48. Polio	a. Circulatory
49. MRSA	b. Digestive
50.Tuberculosis	c. Respiratory
51. Pertussis	d. Integumentary
52. Cholera	e. Nervous

53. Which of the following diseases are the result of arthropod bites?

a. Botulism and mononucleosis b. Anthrax and tetanus
c.West Nile Fever and Rocky Mountain Spotted fever d. Herpes and Legionaire's Disease

54. What structure is responsible for the properties of Eubacteria?

a. spore b. cell wall c. flagellum d. answer not given

55. You have found a single cell that is mobile, and when you examine it in the microscope you discover a small and a large nucleus. What is the most likely type of microbe that you have found?

a. virus b. fungus c. protozoan d. bacterium

56. Which group of microbes does not have a cell wall?

a. Fungi b. Archae c. Eubacteria d. Animal-like protists

57. All of the following statements about the causative agent of AIDS are true except

a. It contains RNA instead of DNA

b. It infects cells of the immune system

c. It produces double stranded nucleic acids that replicate in the cytoplasm

d. It mutates while in the body of a victim.

*** (#58-63) Using letters, indicate which type of microscope is MOST suitable for the situation.**

58. Determining the shape of bacterial cells
59. Observing various microbes in pond water
60. Examining a tissue for viruses
61. Examining mobile protozoans
62. Examining the surface of pollen grains
63. Examining cells for the detailed structure of mitochondria

a. Dissecting
b. Compound Light
c. Transmission Electron
d. Scanning Electron

64. Because penicillin prevents peptidoglycan synthesis, it is more effective on _____ cells.

a. Gram positive bacteria b. Gram negative bacteria

65. When flagella are located around the entire bacterial cell, the arrangement is called

a. polar b. random c. bipolar d. peritrichous

School:_____ **Score:** _____
Team #:____

MICROBE MISSION ANSWER SHEET

1._____
2._____
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IMAGES

66.

67.

68. _____

69._____

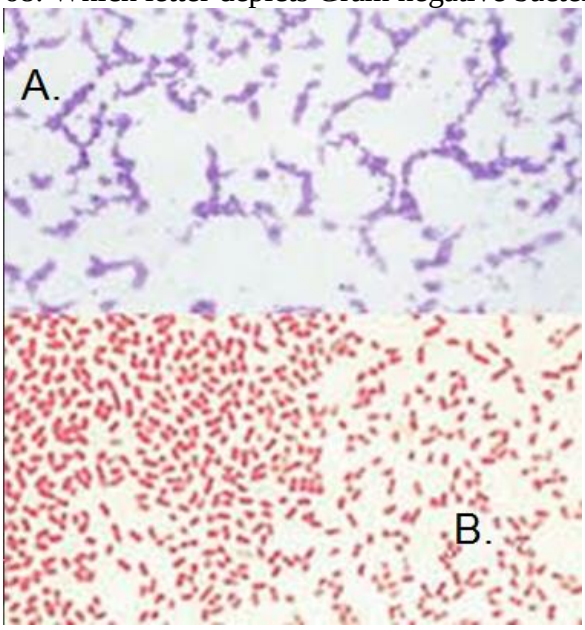
70.

IMAGES

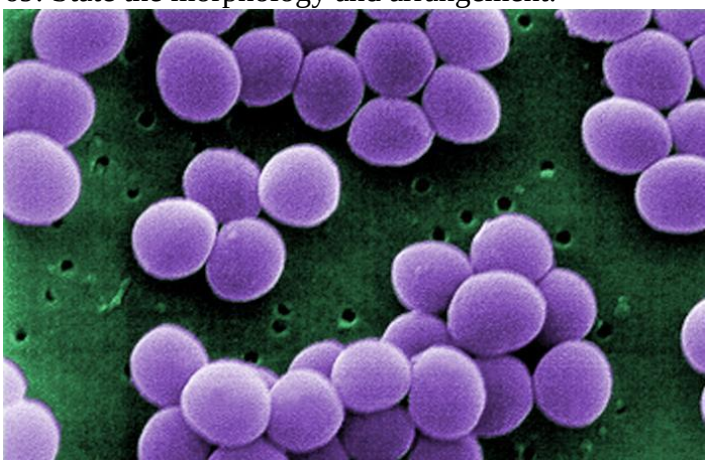
66. Discuss what is going on in this picture. What causes this to happen? What are the ecological impacts?

67. Name the lab technique used in this picture and discuss its purpose.

68. Which letter depicts Gram negative bacteria?



69. State the morphology and arrangement.



70. State the name of this microbe. Describe its defining features.

School: _____ **Score:** ____/83___
Team #: ____

MICROBE MISSION ANSWER (KEY)

1. B
2. B
3. Geometric Sequence
4. 93,750
5. Fungi
6. Closed Culture
7. Lag Phase
8. Log (exponential) Phase
9. Stationary Phase
10. Death (decline) phase
11. B
12. A
13. A
14. C
15. B
16. D
17. A
18. A
19. B
20. B
21. A
22. E
23. C
24. H
25. Compound Light Microscope
26. E
27. K
28. G & C –must have both (2pts)
29. Lytic & Lysogenic – must have both (2pts)
30. A, B, D – must have all (3pts)
31. D
32. C
33. B
34. A
35. F
36. J
37. E
38. K
39. G
40. L
41. I
42. H
43. C
44. D
45. A
46. B
47. B
48. E
49. D
50. C
51. C
52. B
53. C
54. B
55. C
56. D
57. C
58. B
59. B
60. D
61. B
62. D
63. C
64. A
65. D

IMAGES

(5 pts) 66. This picture is showing an Algal Bloom. An algal bloom is a result of an abundance of nutrients, especially phosphorus. Because of the excess nutrients the algae increase their population dramatically. Each alga is short-lived, and the result is a high concentration of dead organic matter which starts to decay. The decay process consumes dissolved oxygen in the water, resulting in hypoxic conditions. Without sufficient dissolved oxygen in the water, animals and plants may die off in large numbers.

(3 pts) 67. This is an example of the **Streak Technique**. In microbiology, **Streaking** is a technique used to isolate a pure strain from a single species of microorganism, often bacteria. Samples can then be taken from the resulting colonies and a microbiological culture can be grown on a new plate so that the organism can be identified, studied, or tested.

68. B

69. Staphylococcus

(4 pts) 70. Euglena. Euglena is a unicellular flagellate protist. They are autotrophic microbes containing chloroplast however they can also take in nutrition heterotrophically. The Euglena has a red eyespot that detects light, permitting it to move in the direction of the light source.