

SSSS Division C Microbe Mission Test

Created by IvySpear

Do not turn the page until instructed

Time Allowed: 50 minutes

You are allowed an 8.5 by 11 inch cheat sheet and non-programmable calculators

Any form of cheating will result in disqualification

Team Name: _____

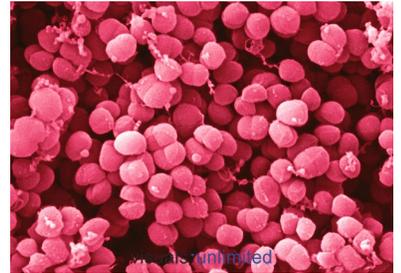
Team Number: _____

Competitor Names: _____

Microbes (15pt)

1. What usually triggers pseudolysogeny? How is it ended? (2pt. 1pt for each part)
2. What is the difference between episomal virus latency and proviral virus latency? (1pt)
3. Name 3 viruses that cause persistent (chronic) infections (3pt. 1pt for each virus):

4. Microbe X triples its population every minute. If the population begins with two cells, what is the first minute mark after the population reaches 10,000? (If you estimate the exact answer to be 2.5 for example, then your given answer should be 3). (2pt)
5. What is the purpose of the final stage of a viral infection in a cell? (1pt)
6. Why do most RNA viruses replicate in the cytoplasm? (2pt)
7. The exosporium is a structure that exists in what type of microbe? (2pt)
8. What is the name of the arrangement of the bacterial cells shown in the picture? (2pt)



Microscopy (13pt)

9. In an electron microscope, why does the specimen have to be in an airless vacuum chamber for the machine to work? (1pt)

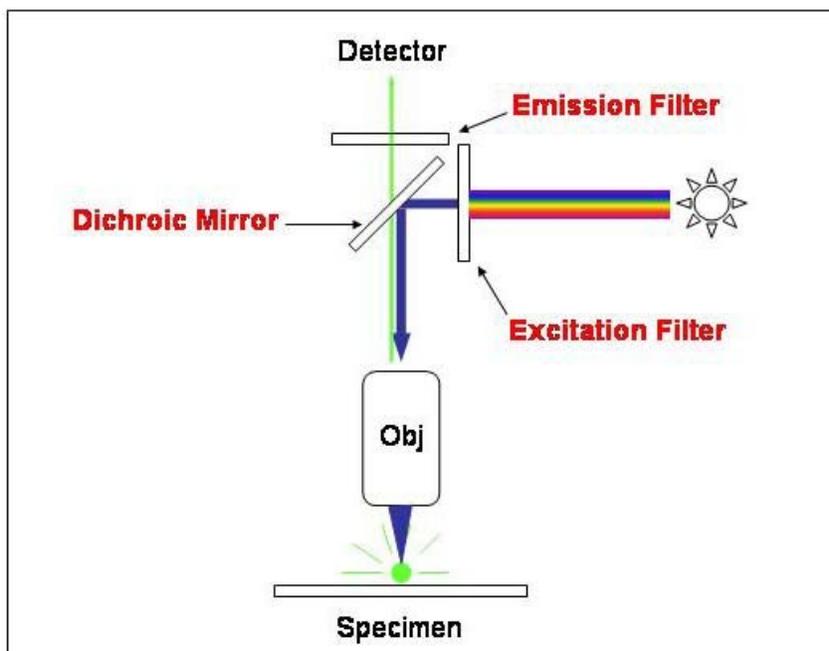
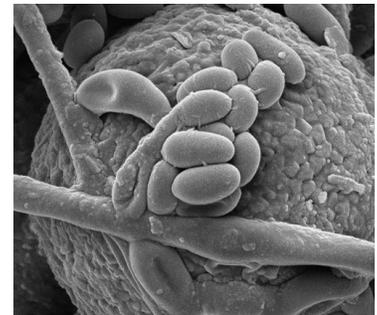
10. What is the scanning acoustic microscope used for in the semiconductor industry? (1pt)

11. What are some disadvantages to scanning probe microscopy? (Name at least two non-related reasons) (3pt. 1pt for each reason capping out at 3)

12. _____ Criterion states that the highest magnification an optical microscope can have is around 1,500x (2pt)

13. Apart from higher resolution, what are some other advantages to neutron imaging over visible light imaging? (2pt. 1pt for each reason capping out at 2)

14. What type of microscope produced the image at the right? (2pt)



15. What type of microscope is depicted to the left? (1pt)

16. What type of microscope produced the above picture? (Hint: the specimen is alive) (1pt)

Gram Stains (10pt)

17. Ziehl–Neelsen stains are also known as what kind of stain? What is it used for? (2pt. 1pt for each part)

18. What is the reason Rickettsiales can't be stained? Name one other bacteria that cannot be stained either and give the reason why. (3pt. 1pt for first part, 1pt for other bacteria, 1pt for reason why)

19. Give the typical gram stain (positive, negative, neither) for the following bacterial shapes/genuses: (5pt. 1pt for each)

- a. Spirochetes
- b. Mycobacteria
- c. Clostridium (bacilli)
- d. Vibrio
- e. Escherichia (bacilli)

Beneficial Bacteria (7pt)

20. Bacteria of the Rhizobium genus have what critical role? (2pt)

21. Lactic Acid Bacteria are beneficial in what ways? (Name at least 3 different reasons) (3pt. 1pt for each reason)

22. What relationship do prebiotics have with probiotics? (2pt)

Antibiotic Resistance: (8pt)

23. Name at least three mechanisms that bacteria use to develop resistance to antibiotics (3pt. 1pt for each mechanism)

24. Describe how superbugs develop. Name three known superbugs: (5pt. 2pt for description, 1pt for each superbug)

Diseases: (10pt)

The following sentences are descriptions of symptoms for certain diseases from the diseases list. Write the name of the disease next to the corresponding symptoms.

25. Koplik spots in mouth (2pt)

26. Cough, secretory diarrhea, headache, fatigue, memory impairment, rash, and difficulty in concentrating (2pt)

27. Short term symptoms include rash/itchy skin, muscle aches, etc. Long term symptoms can include abdominal pain, enlarged liver, or blood in stool/urine (2pt)

28. Chancres in early stage and gummas in late stage. (2pt)

29. Rash, lymphadenopathy, fever, mild pink eye, can cause miscarriages (2pt)

Misc: (6pt)

30. Would phenoxymethylpenicillin or benzylpenicillin (Penicillin G) be more effective against gram-negative bacteria? (2pt)

31. Penicillin causes the complete degradation of the cell walls of gram-positive or gram-negative bacteria? How does it do so? (2pt. 1pt for each part)

32. How would an antipyretic help a patient? What is one common antipyretic? (2pt. 1pt for each part)