

BIO 226R
Exam 1 (Sample)

PRINT YOUR NAME

SSN

Please sign below if you wish to have your grades posted by the last five digits of your SSN

Signature

Exam I has 7 pages and 37 questions.

There are a total of 100 points. It will count as one third of your final grade.

Place your name at the top of each page and check that your exam is complete.

Be brief and precise in your answers. Do not ramble!

Copying and all other forms of cheating will be met with the appropriate disciplinary action.

***YOU MUST HAND OVER YOUR COMPLETED EXAM TO A PROCTOR
WHEN LEAVING THE ROOM***

MAKE SURE THAT YOU SIGN YOUR NAME ON THE SIGN-OUT SHEET

NAME _____ SSN _____

Multiple choice (2 points each): Answer Q # 1-10 on the scantron sheet

- Which of the following represents a complete scientific name written correctly?
 - Escherichia coli*
 - E. coli*
 - Escherichia Coli*
 - Escherichia coli
- Which of the following are prokaryotic?
 - Archaea and Eukarya
 - Archaea and Eubacteria
 - Eubacteria and Eukarya
 - Algae and Archaea
- Length of an *E. coli* cell is approximately 6000 _____.
 - angstroms
 - centimeters
 - micrometers
 - nanometers
- It is hard to stain *Mycobacterium tuberculosis* with simple staining techniques because its cell wall contains a large amount of
 - carbohydrates
 - lipids
 - proteins
 - nucleic acids.
- A cellular organism must have at least _____ (number) of genes.
 - 10
 - 50
 - 250
 - 1000
- Thiomargarita namibiensis*, a “giant” prokaryote, was isolated from the ocean floor of Africa. Its cytoplasm will contain _____ number of ribosomes as compared to that in *E. coli*'s cytoplasm.
 - the same
 - a larger
 - a smaller
- D-glutamic acid is MOST likely to be present in the bacterial
 - capsule
 - cell wall
 - Che A
 - flagellin
- Under which of the following environmental conditions will a Gram positive organism lyse after treatment with lysozyme?
 - isotonic
 - hypertonic
 - hypotonic
- The optimum temperature at which a microorganism grows is closer to the _____ temperature at which this organism can grow.
 - maximum
 - minimum

NAME _____ SSN _____

10. Which of the following does NOT kill or remove endospores?

- a. autoclaving
- b. incineration
- c. pasteurization
- d. filtration through membrane

Short answers:

11. Name the criterion (technique) used by Carl Woese to divide the prokaryotes into two domains. (3 points)

12. "Ms. Strong" has tuberculosis. Which, if any, of the Koch's postulates can be carried out with this one patient? [Answer in less than 20 words] (3 points)

13A. List a situation in which you'll prefer to use gelatin over agar as a solidifying agent (when isolating a microbe). (2 points)

13B. Mention one growth requirement that this microorganism must meet. (2 points)

14. The best resolution obtained with the light microscope is _____, where as that with transmission electron microscope is _____. [Write the correct units.] (4 points)

15. The plasma membrane of Mycoplasmas is a lot weaker / stronger (circle the correct answer) as compared to that of Mycobacteria due to the presence of _____ in the membrane of Mycoplasmas. (4 points)

16. Draw the shape of a typical *Staphylococcus aureus* cell. (3 points)

NAME _____ SSN _____

17. *Pyrodictium occultum* (P. o) is both a thermophile and a member of the Archaea. Knowing this information, answer the following with respect to P.o. appropriately: (4 points)

- a. Its plasma membrane contains cholesterol / hopanoids / porins / Braun's lipoprotein.
- b. Lipids in its plasma membrane could be linked to glycerol by ester / ether / either ester or ether bond.
- c. Its plasma membrane has high levels of saturated / unsaturated fatty acids.
- d. Its cell wall is sensitive to lysozyme. Yes / No

18. Briefly describe the MAIN role of molecular chaperones. (2 points)

19. List 2 MAIN functions of the bacterial cell wall. (4 points)

20A. Eubacterial cell wall contains lysine or mesodiaminopimelic (DAP) acid as the third amino acid in its peptidoglycan subunit. Can the other amino acids, alanine and glutamic acid, replace lysine or DAP? (2 points)

Yes / No

20B. Mention ONE distinct characteristic of lysine and DAP that makes them suitable for that position. (2 points)

21. Which component of the Gram positive cell wall gives it the negative charge? (2 points)

22. Which component of the Gram negative cell wall is responsible for toxicity? (2 points)

NAME _____ SSN _____

23. Arrange the following terms in the order they would be found if you traveled from the cytoplasm to the external medium of a bacterial cell possessing a capsule. (4 points)

- a. periplasmic space
- b. phospholipid layer of the outer membrane
- c. O-polysachharide side chain
- d. plasma membrane
- e. capsule
- f. core polysaccharide

cytoplasm, _____, _____, _____, _____, _____, _____, external environment

24. Mention ONE advantage that a capsule offers bacteria when growing in their natural habitat. (2 points)

25. Draw the “lophotrichous” arrangement of flagella on a “bacillus” shaped cell. (4 points)

26. Name the energy source directly responsible for providing energy to the bacterial flagella? (2 points)

27. Mention 2 factors, other than Calcium, that are responsible for heat resistance in an endospore. (2 points)

28. What activates the endospore to germinate into a vegetative cell? (2 points)

NAME _____ SSN _____

29. Several proteins participate in chemotaxis. Where in the cell (be specific) would you find the following proteins? (4 points)

a. Methyl accepting chemotaxis proteins _____

b. Che Y _____

30. What is the function of Che Z? (Answer in less than 10 words) (2 points)

31A. List the 6 major nutrients (chemical elements, e.g. H, O) required by microorganisms for growth. (2 points)

_____, _____, _____, _____, _____, _____

31B. Which of these element(s) will be present in the ribosome BUT NOT in the ribosomal RNA? (2 points)

32. In ONE sentence describe the difference between active transport and group translocation. (2 points)

33. What is the final electron acceptor for a microaerophile? (2 points)

34. Chemoheterotrophs / photoautotrophs use preformed organic molecules as a source of carbon and energy. (2 points)

NAME _____ SSN _____

35. Mention 3 conditions that influence the activity of an antimicrobial agent. (3 points)

36. Sketch and label the growth curve of a microorganism in batch culture. Show the regions of balanced and unbalanced growth. (6 points)

Bonus:

37. In the article on “Parasites shed light on cellular evolution” (Science), secondary endosymbiosis is proposed as one of the means by which some parasites may have acquired a third distinct set of genetic material. (2 points)

In these organisms, the “newly” acquired plastid contained linear / circular DNA.

Name one of the parasites listed in the article. _____