Microbiology 301 Name _____
Spring Quarter 2010
First Midterm

Version A - Make sure your name is on both the question and answer sheet. You are responsible for the correct transfer of your answers to the computer answer sheet. The exam will be returned along with an individual student score report in a room in the laboratory area (number to be announced). If you wish to have your exam returned privately, give the proctor a note to that effect.

Choose the ONE best answer.

1. In classification, there are two Domains—prokaryotes and eukaryotes.

   A. True
   B. False

2. Which of the following is FALSE:

   A. *Archaea* are often extremophiles.
   B. *Bacillus anthracis* belongs to the species *Bacillus*.
   C. Prions are composed of only protein.
   D. Viroids are composed of nucleic acid only.
   E. Algae are photosynthetic.

3. All of the following are reasons why studying bacteria is important EXCEPT:

   A. They are an important cause of morbidity.
   B. They are essential to life on this planet.
   C. They provide a model for understanding prions.
   D. They provide a model for understanding human cells.

4. *Staphylococcus aureus* is a Gram-positive coccus. Which of the following describes the appearance of a properly stained *S. aureus* cell?

   A. pink and spherical
   B. pink and elongated
   C. purple and spherical
   D. purple and elongated

5. Which of the following about the bacterial cytoplasmic membrane is TRUE?

   A. Water enters the cell via transport proteins.
   B. The membrane is composed of a triple layer of phospholipids.
   C. ATP is able to diffuse across the membrane.
   D. The membrane is located just outside the cell wall, anchored to the wall's outer surface.
   E. Protein complexes within the membrane eject protons from the cell.

6. You are working with a pharmaceutical company interested in developing an antibacterial drug that targets a transport protein. Interfering with which group of transporters is most likely to affect the bacterium without harming the patient?

A. facilitated diffusion
B. active transport
C. group translocation

7. All of the following describe components of peptidoglycan EXCEPT….

A. NAG (*N*-acetylglucosamine)
B. NAM (*N*-acetylmuramic acid)
C. LPS (lipopolysaccharide)
D. glycan
E. peptide side chain

8. All of the following are matching pairs EXCEPT…

A. penicillin - enzyme that degrades peptidoglycan
B. lysozyme - targets peptidoglycan
C. Gram positive cell wall - teichoic acids
D. general secretory pathway - exports proteins
E. porin proteins - Gram negative cells

9. All of the following about bacterial structures/processes are matching pairs EXCEPT….

A. flagella rotation - propeller-like
B. energy for flagella rotation - ATP
C. peritrichous flagella - arrangement that surrounds cell
D. sex pili - prelude to DNA transfer
E. flagellin - structural subunit of flagella

10. Two bacterial isolates have significant difference in the nucleotide sequences of their 16S ribosomal RNA genes. Based on this information, you can conclude that…

A. only one is susceptible to antibiotics that target the ribosome.
B. one has 80S ribosome and the other has 70S ribosomes.
C. one has a 30S ribosomal subunit and the other has a 50S ribosomal subunit.
D. they aren't members of the same species.
E. one is a rod and the other a coccus.

11. A bacterial cell moving towards which of the following is an example of chemotaxis?

A. a magnet
B. a warm heating element
C. a cold heating element
D. glucose

12. Which of the following about endospores is FALSE? They can….

A. multiply.
B. germinate.
C. withstand high temperatures
D. withstand antibacterial chemicals
E. withstand dryness.

13. All of the following are matching pairs EXCEPT….

A. endocytosis - pinocytosis
B. endocytosis - phagocytosis
C. actin - cell movement
D. rickettsia - ancestor of a nucleus
E. cyanobacteria - photosynthesis

14. An experiment began with 6 cells and ended 2 hours later with 96 cells. How many generations did the cells go through during the 2-hour experiment?

A. 48
B. 24
C. 8
D. 6
E. 4

15. With respect to bacterial growth, the intestinal tract could best be described as..

A. an open system with defined media
B. a closed system with defined media
C. an open system with complex media
D. a closed system with complex media

16. All of the following are matching pairs EXCEPT…

A. thermophile - human body
B. mesophile - leaf of an indoor plant
C. psychrophile - glacier-fed lake
D. psychrotroph - refrigerator
E. hyperthermophile - hydrothermal vent

17. A bacterium that grows on MacConkey agar is a….

A. chemoorganoheterotroph
B. chemolithoautotroph
C. chemolithoheterotroph
D. photoautotroph
E. photolithotroph

18. All of the following are matching pairs EXCEPT?

A. fastidious - requires many growth factors
B. fastidious - *Neisseria gonorroheae*
C. MacConkey agar - selective and differential
D. MacConkey agar - *Neisseria gonorrhoeae*
E. Blood agar - differential

19. All of the following are matching pairs EXCEPT…

A. biosynthesis - anabolism
B. energy released - exergonic
C. oxidation - loss of electrons
D. oxidation - loss of hydrogen
E. NAD^+ - reducing power

20. With respect to fate of their electrons, which pair is most similar?

A. NADH - NADPH
B. NADH - $FADH_2$
C. NADPH - $FADH_2$

Use the following to answer questions 21 - 23. Answers can be used more than once or not at all.

A. glycolysis
B. TCA cycle
C. pentose phosphate pathway
D. A and C
E. electron transport chain

21. Glucose is the starting compound

22. Produces the most reducing power

23. Consumes reducing power

24. All of the following are matching pairs EXCEPT….

A. niacin - coenzyme
B. NAD - coenzyme
C. active site - binding site of allosteric inhibitor
D. mercury - non-competitive enzyme inhibitor
E. lipase - enzyme

25. Adding large quantities of a substance that has a high BOD to a small lake would….

A. make the water clearer.
B. kill fish due to its toxicity.
C. decrease the amount of dissolved O_2 in the water.
D. precipitate the phosphates so they're easily removed from the water.
E. promote the growth of algae.

Use the following to answer questions 26 - 28. Answers can be used more than once or not at all.

A. aerobic respiration
B. anaerobic respiration
C. fermentation
D. A and C
E. B and C

26. Can occur in aerobic environments

27. Can occur in anaerobic environments

28. Results in the production of only six of the precursor metabolites

29. Which of the following is TRUE?

A. Fermentation can create a commercially valuable food product.
B. Fermentation can spoil an otherwise commercially valuable food product.
C. A and B

30. Which of the following will lower the a_w of a food most significantly?

A. adding high concentrations of sugar
B. adding high concentrations of acetic acid (vinegar)
C. adding high concentrations of grape juice
D. exposing the food to UV light
E. exposing the food to gamma rays.

31. Which fermentation end product is responsible for the tart taste of yogurt and sour cream?

A. CO_2
B. pyruvic acid
C. lactic acid
D. ethanol
E. A and D

32. Which of the following statements is TRUE?

A. To avoid Staph. food poisoning, ham should be heated immediately before it is consumed.
B. To avoid Staph. food poisoning, home canned green beans should be heated immediately before they are consumed.
C. To avoid botulism, ham should be heated immediately before it is consumed.
D. To avoid botulism poisoning, home canned green beans should be heated immediately before they are consumed.
E. A and B are both true.

33. Which describes the early symptoms of the most life-threatening form of foodborne illness?

A. vomiting and abdominal cramps
B. diarrhea
C. blurry vision and the feeling of a thick tongue
D. none of the above; foodborne illness is not life threatening

Use the following key to answer questions 34 through 40 (answers may be used more than once, or not at all).

A. transcription
B. translation
C. replication
D. A and B
E. A and C

34. The final product is a component of ribosomes.

35. Involves Okazaki fragments.

36. Expression of the β-galactosidase gene requires this process.

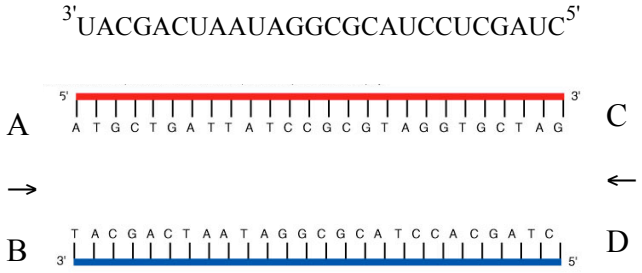
37. Diphtheria toxin, which interferes with a eukaryotic elongation factor, would prevent this process in eukaryotic cells.

38. RNA interference destroys the product of this process.

39. Uses subunits that have a 3'OH.

40. A sequence called a terminator halts this process.

41. Based on the sequence of mRNA below, where did transcription start? (the letter indicates the position on the template strand)



42. Which of the following statements is FALSE?

A. Cells of some types of bacteria can sense the density of cells within their own population.
B. Cells of some types of bacteria randomly alter their gene expression.
C. Once the DNA of a protein-encoding region has been sequenced, the "plus" strand is used to determine the amino acid sequence of the protein.
D. Alternative sigma factors are used to direct transcription of the central metabolic pathways.
E. Enzymes involved in amino acid synthesis are typically repressible.

43. All of the following are matching pairs EXCEPT…

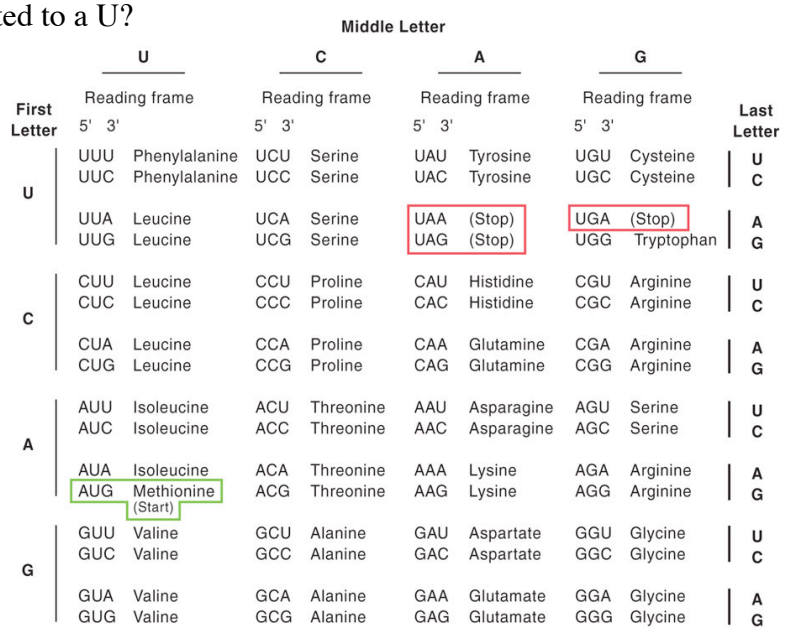
A. bacterial mRNA - monocistronic and polycistronic
B. bacteria mRNA - intron are removed by splicing
C. bacteria - translation begins before transcription is complete
D. eukaryotic mRNA - poly A tail
E. eukaryotic mRNA - translation usually begins at the first AUG

44. All of the following are matching pairs EXCEPT:

A. phenotype - observable characteristics of an organism
B. genotype - the sequence of nucleotides in the DNA of an organism
C. wildtype - strain for which the phenotype corresponds to the genotype
D. prototroph - strain that grows on minimal medium
E. auxotroph - strain that lacks the ability to synthesize a nutrient.

45. Using the genetic code (illustrated below), what is the consequence of the first nucleotide in the codon AGA being converted to a U?

A. missense
B. nonsense
C. silent
D. frameshift
E. real sense



46. Which of the following statements is FALSE?

A. Proofreading by a cellular enzyme that synthesizes DNA would be more important than proofreading by a cellular enzyme that synthesizes RNA.
B. Transposons cause spontaneous mutations as well as induced mutations.
C. X-rays can introduce single- and double-stranded breaks in DNA.
D. Intercalating agents chemically modify purines and pyrimidines.
E. Ultraviolet radiation can cause thymine dimers to form.

47. Which would be the easiest to do in the laboratory?

A. Isolate a prototroph from a population of auxotrophs.
B. Isolate an auxotroph from a population of prototrophs

48. Which type of DNA repair is the most error prone?

A. Excision repair
B. Light repair
C. Mismatch repair
D. Proofreading
E. SOS