Microbiology 301 Name _____
Spring Quarter 2010
Final Exam

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. Which reservoir of infection is the easiest to control?

   A. bats and raccoons
   B. rodents
   C. birds
   D. humans
   E. soil

2. Gonorrhea is difficult to control because…..

   A. the bacterium is resistant to all available antibiotics.
   B. many infections are asymptomatic.
   C. it has a human as well as environmental reservoir.
   D. it spreads easily by skin to skin contact.
   E. it spreads easily by fomites.

3. A recent news article described a *Cryptococcus gatti* strain that is "more lethal than the original strain". If the number of people becoming infected has not changed, which has increased?

   A. morbidity rate
   B. mortality rate

4. A bubo characterizes which of the following?

   A. plague transmitted via a flea bite
   B. malaria transmitted via a mosquito bite
   C. plague transmitted via inhaling infectious particles
   D. malaria transmitted via inhaling infectious particles
   E. tuberculosis transmitted via inhaling infectious particles

5. Most people infected with *Mycobacterium tuberculosis*……

   A. develop the disease immediately.
   B. develop the disease later in life.
   C. never develop the disease.

6. An outbreak of severe diarrheal disease (colitis) was reported in a local hospital, and the staff was reminded to wash their hands with soap and water because alcohol-based hand-sanitizers were not very effective in preventing transmission of the disease. What was the likely cause?

A. *Corynebacterium diphtheriae*
B. *Shigella dysenteriae*
C. *Salmonella* species
D. *E. coli* O157:H7
E. *Clostridum difficile*

7. During which stage of syphilis is the patient typically NOT infectious?

A. primary
B. secondary
C. tertiary
D. primary and secondary
E. secondary and tertiary

8. Altering an antibiotic so it could pass through porin proteins would likely cause a…..

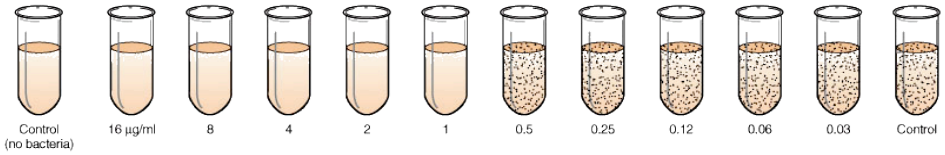
A. Gram-negative bacterium to become resistant to the drug.
B. Gram-positive bacterium to become resistant to the drug.
C. Gram-negative bacterium to become sensitive to the drug.
D. Gram-positive bacterium to become sensitive to the drug.

9. The target of methicillin is the same as that of penicillin.

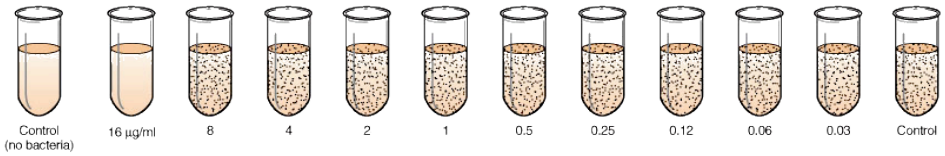
A. True
B. False

10. The illustration below depicts the MIC results for two different bacterial species. Based on the results, you can conclude that….

Bacterium A



Bacterium B



A. bacterium A has an MIC of 0.5
B. bacterium B is resistant to the drug.
C. bacterium B has a higher therapeutic index than bacterium A.
D. bacterium A is Gram-negative.
E. if the Kirby-Bauer test were done, bacterium A would have the larger zone size.

11. Which of the following describes the Influenza virus and Herpesvirus genomes? (ds = double stranded; ss= single stranded.

A. Influenza virus - ds DNA; Herpesviruses - positive-sense ss RNA
B. Influenza virus - positive-sense ss RNA; Herpesviruses - ds DNA
C. Influenza virus - negative-sense ss RNA; Herpesviruses - ss DNA
D. Influenza virus - negative-sense ss RNA; Herpesviruses ds DNA
E. None of the above

12. Which of the following characteristics about Influenza are FALSE?

A. Flu symptoms include 1 week of severe illness and 4-6 weeks of lingering cough
B. You cannot get influenza if you received the flu vaccine each year
C. Influenza infection peaks during the winter months
D. Influenza complications include bacterial and viral pneumonia
E. The age distribution of deaths in the 1918 pandemic was different from that of seasonal influenza.

13. Which of the following statements about influenza "shift" and "drift" is TRUE?

A. The 1918 influenza pandemic was a result of drift
B. Drift occurs every year while shift is more rare
C. Shift occurs mainly human-to-human and drift occurs mainly animal-to-human
D. The recent swine flu outbreak was a result of shift
E. B and D

14. Which of the following about Herpesviruses is TRUE?

A. They are human-specific, meaning other animals are generally not susceptible to herpesviruses.
B. They are typically sexually transmitted.
C. Mononucleosis is the result of a herpesvirus
D. Many herpesviruses cause diarrhea.
E. They are naked viruses, which is why the survive in the GI tract.

15. Which of the following about Herpes Simplex Virus 1 and 2 is FALSE?

A. No vaccine is available.
B. No treatment has been found that can cure the infection.
C. HSV-2 is mainly genital but can also be found orally.
D. Reactivation of the virus can be triggered by hormonal changes.
E. You cannot transmit genital herpes when you have no sores.

16. Which group, when HIV seropositive, often converts to HIV seronegative?

A. neonates
B. teenagers
C. adult males
D. adult females

17. Which part of HIV infection is characterized by "flu-like symptoms"?

A. primary infection
B. asymptomatic phase
C. AIDS
D. none of the above

18. Which of the following is most effective for preventing HIV acquisition/infection?

A. male circumcision
B. STEP/MERCK vaccine
C. protease inhibitors
D. none of the above prevent acquisition/infection

19. Targets of HIV antiviral medications include all of the following processes EXCEPT:

A. fusion
B. reverse transcription
C. integration
D. translation
E. development of functional virions after exiting from cell

20. A company announces that it has discovered a new target for a vaccine against HIV. If their claim is accurate, how long would it take them to license the vaccine?

A. 1 month
B. 1 year
C. 10 years
D. 100 years

21. Which of the following represents the most severe situation?

A. furuncle
B. carbuncle
C. folliculitis
D. all are equally severe

22. Which *Staph. aureus* strains are generally resistant to the greatest variety of antibiotics?

A. CA-MRSA
B. HA-MRSA
C. the two types are equivalent in their susceptibility/resistance

23. *Staphylococcus aureus* and *Streptococcus pyogenes* both have all of the following EXCEPT…..

A. endotoxin
B. Fc binding proteins
C. tissue degrading enzymes
D. blood cell-destroying proteins
E. hemolysins

24. *Staphylococcus epidermidis* can be described as…..

A. chains of catalase positive cells
B. clusters of catalase positive cells
C. chains of catalase negative cells
D. clusters of catalase negative cells

25. Superantigens….

A. cause rheumatic fever
B. cause glomerulonephritis
C. result in excessive cytokine production
D. result in C3b inactivation

26. A hypothetical pathogen is transferred person-to-person by the fecal-oral route and colonizes the esophagus. Based on this information the organism has a…..

A. high infectious dose and produces a toxin
B. low infectious dose and produces a toxin
C. high infectious dose and produces an adhesin
D. low infectious dose and produces an adhesin

27. Cholera toxin causes which of the following effects?

A. Kills intestinal cells.
B. Causes intestinal cells to secrete chloride.
C. Interferes with the ability of intestinal cells to absorb water.
D. Evokes an unusually strong and therefore damaging immune response.
E. Interferes with antigen uptake by M cells.

28. Some bacterial pathogens cause intestinal cells to lose their microvilli. This is due to….

A. production of proteases that physically damage the microvilli.
B. accumulation of sodium in the environment.
C. proteins that cause actin rearrangement.
D. M proteins that are toxic to microvilli.
E. the inflammatory response against the pathogen.

29. With respect to mechanisms of pathogenicity, the most common cause of traveler's diarrhea resembles…

A. *Shigella*
B. *Vibrio cholerae*
C. STEC
D. *Salmonella*
E. Norovirus

30. Hemolytic uremic syndrome is a complication of which disease?

A. urinary tract infections
B. cholera
C. ETEC infections
D. *E. coli* O157:H7 infections
E. giardiasis

31. Which of the following about giardiasis is FALSE?

A. Symptoms include fatty stool and gas
B. Trophozoites adhere to the lining of the small intestine
C. The reservoir includes humans and animals
D. The infectious dose is low
E. Trophozoites are easily transmitted person to person

32. Swimmers itch is most closely related to……

A. staph infection
B. strep infection
C. schistosomiasis
D. giardia
E. malaria

33. A patient came to the hospital with cerebral malaria. Which of the following about the parasite that causes this is FALSE?

A. infects all ages of red blood cells
B. forms hypnozoites
C. causes the red blood cells to adhere to the capillaries.
D. infects liver cells
E. causes anemia

34. The life-threatening symptoms of the disease schistosomiasis are caused by:

A. cercariae entering the skin
B. toxins produced by cerciae
C. adult worms living in the blood
D. adult worms living in the intestine
E. immune response to eggs

35. Vaccination against the malarial merozoite would directly prevent which step of the parasite's lifecycle?

A. growth in liver cells
B. release from red blood cells
C. infection of liver cells
D. infection of red blood cells
E. transmission of the parasite to another host

Use the following to answer questions 36 - 39 as they pertain to bioterrorism (answers can be used more than once or not at all).

1. transmissible person-to-person
2. in the event of an emergency, we should all be able to get vaccinated against it
3. antibiotics are available (prophylactic or for treatment)
4. causative agent is exceptionally hardy

A. 1, 2 B. 3, 4 C. 1, 3 D. none of the above

36. Which of the above applies to the smallpox virus as a biological weapon?

37. Which of the above applies to *Bacillus anthracis* as a biological weapon?

38. Which of the above applies to botulinum toxin as a biological weapon?

39. Which of the above applies to aerosolized *Yersinia pestis* as a biological weapon?

40. Which of the following about smallpox is FALSE?

A. Smallpox vaccine can be protective post-exposure, provided it is given within 3 days.
B. A person who has smallpox is infectious 1 day before initial symptoms develop (fever, aches).
C. Vaccination can cause severe adverse reactions.

41. 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.

42. 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

43. 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.

44. 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

45. 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

46. Glucose is the starting compound of which of the following?

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

47. 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.

48. 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.

49. Diphtheria toxin, which interferes with a eukaryotic elongation factor, would prevent which of the following in eukaryotic cells?

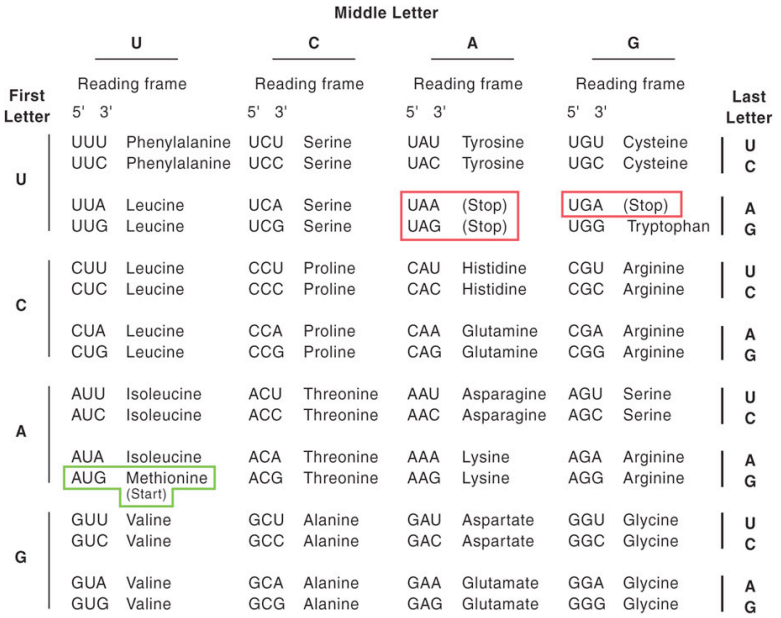
A. transcription
B. translation
C. replication
D. A and B
E. A and C

50. Which of the following incorporates subunits that have a 3'OH?

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

51. 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



First Letter	Middle Letter: U		Middle Letter: C		Middle Letter: A		Middle Letter: G		Last Letter
	Reading frame 5' 3'		Reading frame 5' 3'		Reading frame 5' 3'		Reading frame 5' 3'		
U	UUU	Phenylalanine	UCU	Serine	UAU	Tyrosine	UGU	Cysteine	U
	UUC	Phenylalanine	UCC	Serine	UAC	Tyrosine	UGC	Cysteine	C
	UUA	Leucine	UCA	Serine	UAA	(Stop)	UGA	(Stop)	A
	UUG	Leucine	UCG	Serine	UAG	(Stop)	UGG	Tryptophan	G
C	CUU	Leucine	CCU	Proline	CAU	Histidine	CGU	Arginine	U
	CUC	Leucine	CCC	Proline	CAC	Histidine	CGC	Arginine	C
	CUA	Leucine	CCA	Proline	CAA	Glutamine	CGA	Arginine	A
	CUG	Leucine	CCG	Proline	CAG	Glutamine	CGG	Arginine	G
A	AUU	Isoleucine	ACU	Threonine	AAU	Asparagine	AGU	Serine	U
	AUC	Isoleucine	ACC	Threonine	AAC	Asparagine	AGC	Serine	C
	AUA	Isoleucine	ACA	Threonine	AAA	Lysine	AGA	Arginine	A
	AUG	Methionine (Start)	ACG	Threonine	AAG	Lysine	AGG	Arginine	G
G	GUU	Valine	GCU	Alanine	GAU	Aspartate	GGU	Glycine	U
	GUC	Valine	GCC	Alanine	GAC	Aspartate	GGC	Glycine	C
	GUA	Valine	GCA	Alanine	GAA	Glutamate	GGA	Glycine	A
	GUG	Valine	GCG	Alanine	GAG	Glutamate	GGG	Glycine	G

52. All of the following are reasons why some phages are medically relevant EXCEPT..

A. they also infect eukaryotic cells.
B. their genome encodes toxins.
C. they can destroy bacterial cells.
D. they serve as a model for general viral replication cycles.

53. Which of the following is more correctly called "DNA exchange" because both cells involved acquire new genes.

A. Conjugation
B. Transduction
C. Transformation
D. all of the above
E. none of the above

54. DNA from a crime scene is sometimes analyzed by looking at the STR (short tandem repeat) pattern. Which method is used to do this?

A. cloning
B. PCR
C. Ames test
D. DNA sequencing
E. restriction digesting

55. Studies using luminescent bacteria led to the recognition that many bacteria can…..

A. sense the density of bacterial cells in the immediate environment.
B. produce light.
C. use glucose as a source of energy.
D. fix nitrogen.
E. live as endosymbionts.

56. Which of the following about the immune response is FALSE?

A. During phagocytosis, digestion of microbes occurs once a phagosome forms.
B. Macrophages can become activated.
C. Pro-inflammatory cytokines stimulate inflammation.
D. During inflammation, small blood vessels dilate.
E. Apoptosis does not trigger inflammation

57. Comparing the heavy chains and the light chains of antibody molecules….

A. There are twice as many heavy chains as light chains per antibody molecule.
B. The heavy chain is in the variable region and the light chain is in the constant region.
C. The heavy chain is in the constant region and the light chain is in the variable region.
D. The heavy chains have many more "variable" amino acids than the light chains do.
E. The heavy chains have many more "constant" amino acids than the light chains do.

58. T-independent antigens….

A. are generally proteins.
B. are the most common type of antigen.
C. stimulate primarily an IgE response.
D. are poorly immunogenic in young children.

59. If you remove the "A" component of an AB toxin, what will be the effect? The molecule will no longer…..

A. be toxic
B. be antigenic
C. bind to a host cell
D. be a part of the LPS molecule
E. be a safe vaccine

60. To be protected against tetanus, a booster vaccine is needed once every 10 years. Based on this information, and your knowledge about the disease, which is the best conclusion? The vaccine….

A. is a toxoid
B. contains endotoxin
C. contains attenuated viruses
D. contains attenuated bacteria
E. is a T-independent antigen

61. Handwashing with soap and water can prevent all of the following EXCEPT…

A. shigellosis
B. antibiotic-associated colitis
C. *E. coli* O157:H7 infection
D. tetanus
E. staphylococcus infection

62. With respect to the Category A agents of bioterrorism, which one poses the least natural risk (i.e. if there is no biowarfare attack)

A. Anthrax
B. Botulism
C. Plague
D. Smallpox
E. Ebola and other viral hemorrhagic fevers

63. Which of the following produces a toxin that causes disease when ingested (i.e. causes foodborne intoxication)?

A. *Clostridium difficile*
B. *Mycobacterium tuberculosis*
C. *Neisseria gonorrhoeae*
D. *Staphylococcus aureus*
E. *Corynebacterium diphtheriae*

64. You are living in the San Juan Islands and a bat bites you but barely causes any damage, drawing no blood. Which response is wisest?

A. Apply a bandage
B. Wash the wound with soap and water, and then apply a bandage.
C. Wash the wound with antibacterial soap and water, and then apply a bandage.
D. Call the doctor
E. None of the above because the wound wasn't deep enough to draw blood.

65. Ampicillin is the recommended antibiotic for upper respiratory infections because it cures bacterial as well as viral infections.

A. True
B. False

66. The agent that causes which of the following causes shingles when it reactivates?

A. cold sores
B. mononucleosis
C. genital herpes
D. Kaposi's sarcoma
E. chickenpox

67. Controlling schistosomiasis is most like controlling which of the following diseases?

A. cholera
B. influenza
C. botulism
D. diphtheria
E. syphilis