Chapter 11 Questions

1. Attenuated viruses are produced by
   A) treating viruses with formaldehyde.
   B) disrupting viruses in a blender.
   C) passing viruses from culture to culture until a variant evolves.
   D) irradiating viruses with ultraviolet light.
   E) forming plaques from viruses.

2. Detergent antiseptics inactivate viruses by
   A) dissolving the envelope of enveloped viruses.
   B) altering the nucleic acid of RNA viruses.
   C) disrupting the capsid of all viruses.
   D) precipitating the proteins of the viral capsid.
   E) none of these.

3. Interferons are produced by
   A) viruses as they begin replication.
   B) various body cells on stimulation by viruses.
   C) bacteria in response to viral infection.
   D) drug companies for use against bacteria.
   E) viruses as they complete replication.

4. All viruses possess
   A) a capsid and an envelope.
   B) DNA as well as RNA.
   C) a genome and a capsid.
   D) only DNA.
   E) only RNA.

5. Oncogenes are genes which
   A) the virus utilizes to replicate itself.
   B) convert formaldehyde to formalin in the cytoplasm of a cell.
   C) encourage recombinations in bacteria.
   D) transform normal cells to cancer cells.
   E) influence ongoing protein production.

6. All the following are possible methods for cultivating viruses except
   A) fertilized chicken eggs.
   B) tissue cultures.
   C) laboratory animals.
   D) blood agar medium.
   E) cultures of bacteria.
7. Viral envelopes are usually acquired by
   A) budding through the membrane of the cell.
   B) synthesizing envelope lipids under direction of the virus.
   C) an outgrowth of the genome membrane.
   D) reaction with interferon protein.
   E) interaction between gene and oncogene.

8. Which of the following is an essential feature in viral replication?
   A) The viral capsid must enter the host cell cytoplasm.
   B) The viral envelope must fuse with the cell membrane.
   C) The viral genome must be uncoated in the cell cytoplasm.
   D) The viral genome must fuse with the host cell membrane.
   E) The viral capsid must contain capsomeres.

9. The bacteriophage is a type of virus that
   A) is destroyed by bacteria.
   B) multiplies in bacteriological media.
   C) coexists with bacteria during time of disease.
   D) replicates within bacteria.
   E) lives within the bacterial nucleus.

10. Rous, Shope and Burkitt independently investigated the
    A) mechanisms of viral inhibition.
    B) specifics of viral replication.
    C) methods for viral cultivation.
    D) possibilities of viral transformation of cells.
    E) development of viral vaccines.

11. Formaldehyde is useful in the inactivation of viruses because it
    A) dissolves the lipids of the capsid.
    B) reacts with free amino groups on nitrogenous bases.
    C) precipitates the protein component of the envelope.
    D) replaces important bases in the construction of the genome.
    E) converts proto-oncogenes to oncogenes.

12. The neuraminidase of influenza viruses assists in
    A) attachment to the host cells.
    B) digestion of nuclear components of the cell.
    C) disintegration of the cell at the conclusion of the replication cycle.
    D) assembly of viral components.
    E) budding process through the cell membrane.
13. The largest viruses approximate the size of the
A) streptococci and staphylococci.
B) fungal spore and protozoal cyst.
C) smallest protozoa.
D) body's red blood cells.
E) chlamydiae and mycoplasmas.

14. A virus with icosahedral symmetry resembles
A) a polyhedron with 20. triangular faces and 12. corners.
B) a rhombencephalogram with 16. right-angular faces.
C) a triangle with an extended neck and a polyhedral head.
D) a stretched-out spiral having a circular tail and square apex.
E) none of the above.

15. The nucleocapsid of a virus
A) consists only of DNA.
B) is the genome plus the capsid.
C) includes the membranelike envelope.
D) surrounds the capsid of the virus.
E) can exist as a helix but not an icosahedron.

16. In the bacteriophage replication cycle
A) the period of penetration precedes the period of biosynthesis.
B) lysozyme does not function.
C) lysogeny always takes place.
D) the burst time averages 2 to 4 hours.
E) complete virions are assembled outside the host cell.

17. Animal viruses have attachment sites
A) only on the nucleic acid portion of the virus.
B) only on the envelope of the virus.
C) on the tail of the virus.
D) within the genome of the virus.
E) over the entire surface of the capsid.

18. The retrovirus can synthesize DNA from RNA because it contains
A) the necessary glucose molecules.
B) envelope proteins that provide receptor sites.
C) the enzyme reverse transcriptase.
D) cytoplasm within its genome.
E) an indwelling bacteriophage in a lysogenic state.
19. The viruses of influenza, measles and mumps are known for their ability to
   A) multiply within bacteria.
   B) clump red blood cells.
   C) form Negri bodies in brain cells.
   D) cause cancer.
   E) exist without any nucleic acid.

20. The cytopathic effect (CPE) may be observed when viruses
   A) are replicating in tissue culture cells.
   B) are inducing Koplik spot formation.
   C) are forming new capsid proteins.
   D) have entered the state of lysogeny with host cells.
   E) have induced cells to produce interferons.

21. Lipshutz bodies are unclear granules observed in
   A) the mouth during the early stages of measles.
   B) cells that have reverted to cancer cells.
   C) the skin of people with smallpox.
   D) bacteria invaded by bacteriophages.
   E) cells from patients with herpes simplex.

22. Where bacteriophages have destroyed the cells in a lawn of bacteria
   A) a clumping of red blood cells will occur.
   B) interferons will form.
   C) a plaque will be observed.
   D) no noticeable change will be obvious.
   E) reverse transcriptase will accumulate.

23. Base analogs are antiviral drugs that are
   A) related to penicillin.
   B) erroneously incorporated into viral DNA.
   C) effective against bacteriophages but not human viruses.
   D) able to induce interferon production in cells.
   E) capable of inciting viruses to clump together.

24. Inactivated viruses used in vaccines
   A) multiply in the body at a low rate.
   B) contain lysogenic proviruses that induce antibody formation.
   C) act like drugs in the body.
   D) cannot replicate in the body.
   E) are produced by multiple transfers in tissue culture media.
25. Halogen compounds, heavy metal compounds and phenol derivatives inactivate viruses by
A) altering the structure of the genome.
B) changing the protein structure of the capsid.
C) dissolving the lipid structure of the envelope.
D) changing DNA to RNA within the viral core.
E) interacting with the spikes of the viral envelope.

26. The nucleic acid of a virus encased in its protein coat is often referred to as the
A) genome.
B) nucleocapsid.
C) virion.
D) capsid.

27. Research has generated several drugs that interrupt the viral replication cycle. One such drug reacts with the attachment to host cells by influenza viruses. This drug is
A) isatin-B-semithiocarbazone.
B) amantadine.
C) iodo-deoxyuridine.
D) interferon.

28. The togaviridae cause equine encephalitis and other diseases. These RNA viruses have a symmetrical capsid with 20. equilateral triangles with 20. edges and 12. points. Such a capsid is an example of a(n)
A) helical capsid.
B) icosahedral capsid.
C) complex capsid.
D) ovoid capsid.

29. Yellow fever is a viral disease of the liver. As such, the yellow fever virus is classified as
A) pneumotropic virus.
B) dermatropic virus.
C) viscerotropic virus.
D) neurotropic virus.

30. For many years it was not understood how an RNA virus could transform its host cell, causing a tumor to develop. This dilemma was solved with the discovery of
A) chromosomal-bound RNA.
B) RNA polymerase.
C) reverse transcriptase.
D) DNA polymerase.
31. Enveloped viruses are released from the host cell by
   A) lysing their host.
   B) budding through the host membrane.
   C) lysogenizing their host.
   D) use of reverse transcriptase.

32. The rabies virus is a(n)_______ virus, which is classified in the_______ group.
   A) DNA, herpesviridae
   B) RNA, herpesviridae
   C) DNA, rhabdoviridae
   D) RNA, rhabdoviridae

33. A microbiologist had isolated a brick-shaped virus that contains DNA and has no
    envelope. The virus is approximately 25. nm in diameter. She should classify this virus
    in the
   A) poxviridae.
   B) herpesviridae.
   C) papovaviridae.
   D) parvoviridae.

34. The 194 Nobel prize was given for the development of tissue culture techniques that
    allowed the cultivation of animal cells in laboratory flasks. This prize was shared by
   A) Salk and Sabin.
   B) Iwanowski and Stanley.
   C) Enders, Weller, and Robbins.
   D) Ellerman and Bang.

35. Rous sarcoma virus causes a cancer in chickens. This is a(n)_______ virus, which is
    classified in the________ because it contains reverse transcriptase.
   A) DNA, papovaviridae
   B) RNA, papovaviridae
   C) DNA, retroviridae
   D) RNA, retroviridae

36. You have isolated an animal virus whose capsid is a tightly wound coil resembling a
corkscrew or spring. Such a capsid is referred to as a(n)
   A) icosahedron.
   B) helix.
   C) complex virion.
   D) capsomere.
37. Bacteriophage can be detected in the laboratory because they form
   A) plaques.
   B) Negri bodies.
   C) Downey cells.
   D) Lipshutz bodies.

38. Because viruses have neither a cell wall nor metabolism, they are not susceptible to
   A) antibodies.
   B) interferon.
   C) antibiotics.
   D) attenuation.

39. Frederick Twort and Felis d'Hérrelle were the first to describe
   A) animal viruses.
   B) bacteriophage.
   C) plant viruses.
   D) cancer viruses.

40. Virus capsids can usually be classified as to one of the following shapes, except
   A) icosahedron.
   B) helix.
   C) icosahedron head with tail.
   D) spherical.

41. All of the following are classes of antiviral drugs except:
   A) Reverse transcriptase inhibitors
   B) DNAase inhibitors
   C) Protease inhibitors
   D) Neuramindase inhibitors

42. Prions were identified in association with which of the following;
   A) brain cell
   B) lung cells
   C) bacterial cells
   D) muscle cells

43. All of the following can be used to describe nanobes except:
   A) they form colonies
   B) they contain DNA
   C) they are slightly larger than mycoplasmas
   D) they have chemical stuctures consistent with living things
44. Prion protein is designated as:
   A) PrP
   B) PrPc
   C) PrPsc
   D) PrPp

45. The HA test depends on the presence of _________ in the virion of the infecting virus.
   A) spikes
   B) herpes antigen
   C) hemagglutinin
   D) neuraminidase

46. Select one of the following four choices for each of the phrases below:

   _____induces the body to produce antibodies.
   _____flexible membrane composed of protein and lipid
   _____must enter the host cytoplasm for replication to occur
   _____affected by base analogs in viral inhibition
   _____number is characteristic for a particular virus
   _____protein subunits of the capsid
   _____altered by formaldehyde in vaccine production
   _____similar to the cell membrane except with viral components
   _____contains functional projections called spikes
   _____may be either DNA or RNA but not both
   _____fuses with the cell membrane in replication
   _____altered by halogen and heavy metal disinfectants
   _____acquired by "budding"
   _____subdivided to capsomeres in some viruses
   _____protective covering for the genome
   _____responsible for symmetry of virus
   _____called the genome
   _____composition changed in inactivated virus
   _____exists in segments in some viruses
   _____proteins organized to enzymes to assist penetration

   a. viral capsid
   b. viral nucleic acid
   c. viral envelope
   d. viral capsomeres
47. Match each word or phrase with its correct characteristic.

_____bacteriophage  
_____capsid  
_____prophage  
_____CPE  
_____plaque  
_____spike  
_____genome  
_____release  
_____temperate virus

a. chemical resembling DNA base  
b. cells damaged by virus action  
c. sign of measles  
d. chemical which inhibits virus replication in cells  
e. virus which attacks bacteria  
f. replicated viruses leave host cell  
g. immunity-producing gamma globulins  
h. protein layer around viral nucleic acid  
i. host not immediately attacked by virus  
j. total hereditary information  
k. cleared area among host cells contains virus  
l. phage DNA in the lysogenic state  
m. single virus particle  
n. projects from envelope of virus

48. The work of Iwanowski and Beijerinck was critical to the elucidation of the structure of viruses.  
A) True  
B) False

49. The enzyme lysozyme degrades the bacterial cell wall at the conclusion of the replication cycle of a bacteriophage.  
A) True  
B) False

50. The length of time for viral replication is about 20. minutes and is virtually identical for all viruses.  
A) True  
B) False
51. The laboratory cultivation of viruses in test tube media containing living cells was an essential step in the development of vaccines for viral diseases.
   A) True
   B) False

52. The availability of reverse transcriptase in DNA tumor viruses provides a mechanism for producing RNA from viral DNA.
   A) True
   B) False

53. Plaques are areas of disintegrated cells caused by viral multiplication in cells in a culture medium.
   A) True
   B) False

54. Base analogs inhibit the replication of viruses by preventing attachment of the virus to the host cell surface.
   A) True
   B) False

55. Inactivated viruses used in vaccines lack the ability to multiply after they have been injected to the human body.
   A) True
   B) False

56. Ultraviolet light inhibits bacterial replication by reacting with the thymine molecules of the capsid.
   A) True
   B) False

57. Koplik spots, Lipshutz bodies, and Downey cells are all regarded as signs of the presence of viruses in body tissue.
   A) True
   B) False

58. The key feature of the electron microscope is the long wavelength of the electron beam, a factor that ensures that energy will strike minute viruses.
   A) True
   B) False
59. Viroids are tiny fragments of nucleic acid known to cause several plant diseases and believed involved in human and animal diseases.
   A) True
   B) False

60. Substantial evidence exists that prions are RNA viruses that cause multiple human diseases such as herpes simplex and chickenpox.
   A) True
   B) False

61. Cancer cells differ from normal cells in that cancer cells undergo mitosis more rapidly, stick together less firmly, and undergo dedifferentiation. 
   A) True
   B) False

62. Every case of cancer is associated with a carcinogen.
   A) True
   B) False

63. An RNA-containing retrovirus is able to transform normal T-lymphocytes into malignant T-lymphocytes and thereby induce T-cell leukemia.
   A) True
   B) False

64. One method of detecting viruses is to inoculate them into fertilized eggs and observe characteristic changes in the tissue of the egg.
   A) True
   B) False

65. The classification system for viruses is widely accepted and quite similar to the system for bacteria, with each virus having a genus name and species modifier.
   A) True
   B) False

66. Lysogeny is achieved when a virus incorporates its DNA or RNA (via DNA. into a chromosome of its host cell.
   A) True
   B) False
67. In some DNA viruses, a division of labor occurs during replication, with genomes synthesized in the host cell nucleus and capsids produced in the cytoplasm.  
   A) True  
   B) False

68. Neuramidase is an enzyme associated with the viral capsid.  
   A) True  
   B) False

69. The protein structure of prions appears to be pleated sheets of proteins clumped together.  
   A) True  
   B) False

70. Discuss the process of bacteriophage replication in the host cell with emphasis on the attachment, penetration, synthesis and release phases of the cycle. Show how this compares to animal virus replication.

71. Write an essay on cancer beginning with a description of the nature of cancer and the cancer cell. Include some evidence for viruses as carcinogens and indicate how viruses may induce cancer.

72. List various chemical substances employed for the inhibition of viruses inside the body and describe the mechanism of action for each.

73. Describe the early reports of viruses and discuss the importance of the electron microscope and the tissue cultivation of viruses in the development of virology.

74. Name the structural components of a viral particle and explain the important functions of each. Describe the size range of viruses.

75. Describe several methods for the inactivation of viruses and show how some may be useful in the development of viral vaccines.

76. Explain the oncogene theory for the emergence of a cancer and indicate how viruses may play a role in this process.
77. Outline several methods available to laboratories for detecting viruses in tissue samples.

78. Summarize the replication cycle of the RNA-containing viruses known as retroviruses.

79. Write a paragraph on the concept of lysogeny explaining how it comes about and some of its implications and effects.

80. Crossword Puzzle: Viruses

Across
1. One configuration of capsomeres is the ______-tamer.
2. Difficult to develop for viral disease.
6. Possible capsid symmetry.
10. Destroys viruses.
12. Complete virus outside the cell.
14. Light that inactivates viruses.
15. Process by which HIV exits the host cell.
17. Nucleic acid component of virus.
22. Cell (abbr.) that unites with influenza virus.
24. Pathogenic virus currently in the news.
25. Bacterial virus (abbr.)  
28. Drug used against herpesviruses.  
31. Viral disease of CNS.  
32. Genome covering.  
34. A virus attaches to a host's receptor.  
35. Instrument (abbr.) for viewing viruses.  
36. The influenza virus spike contains __________ - raminidase.  
37. Subacute sclerosing __________ -encephalitis.  
40. Possible genome component.  
43. A viral family is __________ -myxoviridae.  
44. Symmetry of rabies virus.  
45. Part of the tail assembly of a bacteriophage.  
47. May be caused by a virus.  
48. Adenoviruses may be the cause of __________ - ingitis.  
49. Some viruses are acquired by __________ -tact.  
50. A viral family is __________ -viridae.  
53. Viral genome remains within a host cell for a period of time.  
54. Where poxviruses replicate.  
55. The __________ -viruses may be involved in tumor formation.  

Down  
1. Product of phage replication in lawn of bacteria.  
3. Tract (abbr.) where rotaviruses replicate.  
4. Indwelling virus.  
5. Cycle in which virus replicates.  
7. Envelope extension.  
8. DNA virus (abbr.) possibly involved in infectious mononucleosis.  
9. Unit for measuring viruses.  
11. Culture used for viral propagation.  
13. An antiviral drug is __________ -xuridine.  
16. Describes the effect of viruses in host cells (abbr.).  
18. Encloses nucleocapsid.  
19. Vaccine for three viral diseases.  
20. Genome covering.  
21. A virus enters its host cell by __________ -ocytosis.  
23. Viruses are cultivated in cultures.  
26. The surf- __________ antigens of hepatitis A virus are used for diagnosis.  
27. Varicella is an alternate name for chicken- __________ .  
29. Virus (abbr.) that causes cells to enlarge.  
30. Natural antiviral substance.  
33. Genome composition of herpesvirus.  
38. Ganciclovir is one of several base __________ used against viruses.  
39. AIDS virus (abbr.)  
41. The immunity that develops after a case of influenza is __________ -ural.  
42. Type of DNA icosahedral enveloped virus.  
43. The poliovirus is a __________ -mavirus.
44. Viral interaction with RBCs results in _________-agglutination.
46. AIDS treatment (abbr.).
51. The _________-ogene theory helps explain tumor development.
52. A genome is found in _________ viruses.
Answer Key -- Chapter 11

1. C
2. A
3. B
4. C
5. D
6. D
7. A
8. C
9. D
10. D
11. B
12. A
13. E
14. A
15. B
16. A
17. E
18. C
19. B
20. A
21. E
22. C
23. B
24. D
25. B
26. B
27. B
28. B
29. C
30. C
31. B
32. D
33. A
34. C
35. D
36. B
37. A
38. C
39. B
40. D
41. B
42. C
43. D
44. C
45. C
46. a,c,b,d,d,b,c,b,c,a, c,a,a,a,b,b,b,a
47. e,h,l,b,k,n,j,f,i
48. B
49. A
50. B
51. A
52. B
53. A
54. B
55. A
56. B
57. A
58. B
59. A
60. B
61. A
62. B
63. A
64. A
65. B
66. A
67. A
68. B
69. A
70. (No answer.)
71. (No answer.)
72. (No answer.)
73. (No answer.)
74. (No answer.)
75. (No answer.)
76. (No answer.)
77. (No answer.)
78. (No answer.)
79. (No answer.)
80.