AP Biology--Chapters 13, 14, 16, 17 Review

1. Viruses consist of
   A) a protein core and a nucleic acid capsid.
   B) a cell wall surrounding nucleic acid.
   C) RNA and DNA enclosed in a membrane.
   D) a nucleic acid core surrounded by a protein capsid and in some cases a membrane.

2. Bacterial cells that are resistant to viruses
   A) lack a cell surface receptor that the virus must bind to infect the cell.
   B) harbor a prophage in their chromosome, making the bacterial cell immune to further viral infection.
   C) cannot be lysed by the bacteriophage.
   D) All of the above

3. Lytic bacterial viruses
   A) infect the cell, replicate their genomes, and lyse the cell.
   B) infect the cell, replicate their genomes, transcribe and translate their genes, and lyse the cell.
   C) infect the cell, replicate their genomes, transcribe and translate their genes, package those genomes into viral capsids, and lyse the cell.
   D) infect the cell, translate their RNA, and lyse the cells.

4. Animal viruses that integrate their DNA into the host chromosome
   A) are RNA viruses.
   B) are prophages.
   C) copy their RNA genome into DNA using reverse transcriptase.
   D) Both a and c

5. During conjugation,
   A) DNA from one bacterial cell is transferred to another bacterial cell using a bacteriophage.
   B) mutants that are auxotrophic for one nutrient can be converted to prototrophs when mixed with mutants that are auxotrophic for another nutrient.
   C) a pilus is synthesized, and DNA is transferred from one bacterium across the conjugation tube to the recipient bacterium.
   D) Both b and c

6. Plasmid DNA may contain genes that can
   A) confer drug resistance to the host cell.
   B) regulate conjugation.
   C) confer resistance to heavy metals.
   D) All of the above

7. An operon
   A) is regulated by a repressor binding at the promoter.
   B) has structural genes that are all transcribed from same promoter.
   C) has several promoters, but all of the structural genes are related biochemically.
   D) is a set of structural genes all under the same translational regulation.

8. If the gene encoding the lac repressor is mutated so that the repressor can no longer bind the operator, will transcription of that operon occur?
   A) Yes, but only when lactose is present.
   B) No, because RNA polymerase is needed to transcribe the genes.
   C) Yes, because RNA polymerase will be able to bind the promoter and transcribe the operon.
   D) No, because cAMP levels are low when the repressor is nonfunctional.

9. If the gene encoding the trp repressor is mutated such that it can no longer bind tryptophan, will transcription of the trp operon occur?
   A) Yes, because the *trp* repressor can only bind the *trp* operon and block transcription when it is bound to tryptophan.
   B) No, because this mutation does not affect the part of the repressor that can bind the operator.
   C) No, because the *trp* operon is repressed only when tryptophan levels are high.
   D) Yes, because the *trp* operon can allosterically regulate the enzymes needed to synthesize the amino acid tryptophan.

10. Transcriptional regulation in prokaryotes can occur by
    A) a repressor binding an operator and preventing transcription.
    B) an activator binding upstream from a promoter and positively affecting transcription.
    C) different promoter sequences binding RNA polymerase more tightly, resulting in more effective transcriptional initiation.
    D) All of the above

11. Comparative genomics
    A) assigns function to the products of genes.
    B) assigns functions to regulatory sequences.
    C) compares genes in different organisms to see how the how those organisms are related physiologically.
    D) All of the above

12. A transposon is used to inactivate genes in a bacterium. If the inactivated gene is essential the bacterium will
    A) live.
    B) die.
    C) be a prototroph.
    D) be resistant to viral infection.

13. In order to infect a plant, plant viruses must
    A) pass through the cell wall as well as the plasma membrane.
    B) utilize an insect vector to travel from plant to plant.
    C) spread through the plasmodesmata between cells.
    D) All of the above

14. Eukaryotic chromosomes
    A) are circular and contain origins and terminator sequences.
    B) are linear and have origins and telomeres.
    C) contain coding and noncoding sequences.
    D) Both b and c

15. Model eukaryotic organisms have helped biologists understand
    A) genes involved in development.
    B) gene families.
    C) genes encoding proteins that are essential for all cells.
    D) All of the above

16. Moderately repetitive DNA includes
    A) only coding sequences.
    B) only noncoding sequences.
    C) coding and noncoding sequences.
    D) satellites, minisatellites, and microsatellites.

17. Transposable genetic elements
    A) always affect the cell adversely, because when they move, they inactivate genes.
    B) are retroviruses.
    C) provide a mechanism for moving genetic material from organelle genomes to the nuclear genome.
    D) always replicate their DNA when they move.

18. Introns are DNA sequences that
    A) code for functional domains in proteins.
    B) are removed from pre-mRNA by spliceosomes.
    C) allow one gene to make different gene products, depending on which introns are removed during splicing.
    D) Both b and c

19. Pre-mRNAs must be processed in the nucleus in order to
    A) increase their stability in the cytoplasm.
    B) allow RNA polymerase to initiate transcription.
    C) permit coding sequences to be joined to adjacent noncoding sequences.
    D) facilitate ribosome recognition in preparation for DNA synthesis.

20. Coordinated regulation of genes in eukaryotic cells
    A) is the result of positioning the same regulatory sequence in front of each gene.
    B) results from all of those genes being under the control of one promoter.
    C) occurs because related genes all have the same operons.
    D) occurs because enhancers cause DNA to bend.

21. The transcription complex includes _____ and _____.
    A) transcription factors; promoters
    B) regulator proteins; regulators
    C) repressor proteins; silencers
    D) Both a and b

22. DNA binding proteins
    A) have distinct three-dimensional structures that allow them to bind to the DNA.
    B) can be transcription factors.
    C) can help condense the DNA in the nucleus.
    D) All of the above

23. Chromatin structure must be altered for gene expression to occur because
    A) condensed chromatin is replicated but not transcribed.
    B) condensed chromatin makes most DNA sequences inaccessible to the transcription complex.
    C) decondensed chromatin has more nucleosomes per DNA molecule.
    D) heterochromatin is actively transcribed and euchromatin is not transcribed.

24. When DNA sequences are moved to new sites on a chromosome,
    A) new genes can be transcribed.
    B) genes can be inactivated.
    C) new genes can be created.
    D) All of the above

25. Posttranscriptional regulation can include
    A) binding of repressor on silencer regions.
    B) insertion and alteration of nucleotides.
    C) decreasing mRNA stability in the cytoplasm.
    D) Both b and c

26. Cloning a gene may involve
    A) restriction endonucleases and ligase.
    B) plasmids and bacteriophage λ.
    C) yeast artificial chromosomes and complementary base pairing.
    D) All of the above

27. Restriction endonucleases
    A) are enzymes that process pre-mRNAs.
    B) are enzymes that degrade DNA.
    C) protect bacterial cells from viral infections.
    D) All of the above

28. DNA fragments are separated using gel electrophoresis
    A) because DNA is pulled through the gel toward the negative end of the field.
    B) because larger DNA fragments move faster through the gel than smaller DNA fragments.
    C) to identify and isolate DNA fragments.
    D) to synthesize DNA for cloning.

29. Complementary base pairing is important for
    A) ligation reactions with blunt-end DNA molecules.
    B) hybridization between DNA and transcription factors.
    C) restriction endonucleases to cut cell walls.
    D) synthesizing cDNA molecules from mRNA templates.

30. For a prokaryotic vector to be propagated in a host bacterial cell, the vector needs
    A) telomeres.
    B) centromeres.
    C) drug-resistance genes.
    D) an origin of replication.

31. For a eukaryotic vector to be propagated in a host eukaryotic cell, the vector needs
    A) telomeres.
    B) centromeres.
    C) an origin of replication.
    D) All of the above

32. Fragile-X syndrome is
    A) due to a single base change in the DNA.
    B) caused by changing a valine to a glutamic acid.
    C) caused by triplet expansion.
    D) caused by a chromosomal translocation.

33. Triplet repeat expansions
    A) occur during DNA replication due to slippage of DNA polymerase.
    B) are caused by errors in DNA synthesis with reverse transcriptase.
    C) differences can be identified using RFLP mapping.
    D) Both a and c

34. Prions
    A) cause scrapie in sheep.
    B) are caused by abnormally folded proteins interfering with normal brain cell function.
    C) cause "mad cow disease."
    D) All of the above

35. Mutations that result in human disease include
    A) triplet expansions that occur during DNA synthesis.
    B) point mutations that do not change the amino acid sequence of the gene.
    C) prion-like diseases such as kuru.
    D) Both a and b

36. Genetic screening has been used to identify
    A) embryos carrying a mutant allele.
    B) newborns who have PKU.
    C) fathers who are carriers for X-linked diseases.
    D) Both a and b

37. For gene therapy to be most effective, genes should be inserted in _____ cells.
    A) white blood
    B) red blood
    C) stem
    D) All of the above

38. The human genome allows scientists to
    A) understand regulatory sequences that are important for gene expression.
    B) locate genes that cause disease.
    C) understand evolutionary relationships by comparing human genes to genes in other organisms.
    D) All of the above

39. Proteomics has been used to compare
    A) DNA sequences between closely related species.
    B) gene expression during embryonic development.
    C) protein expression between closely related species.
    D) shotgun cloned sequences.

40. Reporter genes include genes for
    A) drug resistance.
    B) bioluminescence.
    C) DNA origins.
    D) Both a and b

41. Vectors include
    A) bacterial and plant plasmids.
    B) viruses.
    C) artificial chromosomes.
    D) All of the above

42. Which of the following biotechnology products is made by insertion of recombinant DNA into bacteria?
    A) Insulin
    B) Tissue plasminogen activator
    C) Erythropoietin
    D) All of the above

43. A cDNA clone is
    A) mostly cytosine.
    B) a copy of the DNA identical to the nuclear gene.
    C) a copy of noncoding DNA.
    D) a DNA molecule complementary to an mRNA molecule.

44. Gene expression can be inhibited by
    A) antisense RNA.
    B) knockout genes.
    C) DNA chips.
    D) Both a and b

45. DNA fingerprinting works because
    A) genes containing the same alleles make it simple to compare different individuals.
    B) PCR allows amplification of proteins from single cells.
    C) there are multiple alleles for some DNA sequences, making it possible to obtain unique patterns for each individual.
    D) DNA in the skin cells is very diverse.

46. DNA chip technologies can be used to
    A) predict who will get cancer.
    B) show transcriptional patterns in an organism during different times of development.
    C) clone DNA.
    D) make transgenic plants.

47. Genes can be inactivated by
    A) inaccurate removal of introns.
    B) transposable genetic elements.
    C) movement of genes to heterochromatic regions of the chromosome.
    D) All of the above

Answer Key

1. D
2. D
3. C
4. D
5. D
6. D
7. B
8. C
9. A
10. D
11. C
12. B
13. D
14. D
15. D
16. C
17. C
18. D
19. A
20. A
21. D
22. D
23. B
24. D
25. D
26. D
27. C
28. C
29. D
30. D
31. D
32. C
33. D
34. D
35. A
36. D
37. C
38. D
39. C
40. D
41. D
42. D

43. D
44. D
45. C
46. B
47. D