CHAPTER 10 – BSC 1005 (General Education Biology Lecture, Professor Chiappone)
THE STRUCTURE AND FUNCTION OF DNA (Simon et al. 2013, 5th edition)

SAMPLE QUESTIONS

1. The backbone of DNA consists of ________.
   (a) nitrogenous bases
   (b) a repeating sugar-nucleotide-sugar-nucleotide pattern
   (c) a repeating sugar-phosphate-sugar-phosphate pattern
   (d) a repeating ACTGACTG pattern
   (e) paired nucleotides

2. RNA contains the nitrogenous base ________ instead of ________, which is only found in DNA.
   (a) a deoxyribose sugar . . . a ribose sugar
   (b) nucleotides . . . nucleic acids
   (c) uracil . . . thymine
   (d) cytosine . . . guanine
   (e) adenine . . . guanine

3. In a DNA double helix, adenine pairs with ________ and guanine pairs with ________.
   (a) cytosine . . . thymine
   (b) guanine . . . adenine
   (c) uracil . . . cytosine
   (d) thymine . . . cytosine
   (e) cytosine . . . uracil

4. Who discovered the structure of DNA?
   (a) Pauling
   (b) Watson and Crick
   (c) Chase
   (d) Franklin
   (e) Hershey and Chase

5. What type of chemical bond joins the bases of complementary DNA strands?
   (a) ionic
   (b) covalent
   (c) hydrophobic
   (d) hydrophilic
   (e) hydrogen

6. During replication, ________ are the enzymes responsible for joining the nucleotides of a new DNA strand together.
   (a) DNA helicases
   (b) DNA ligases
   (c) DNases
   (d) DNA polymerases
   (e) DNA gyrases

7. What name is given to the collection of traits exhibited by an organism?
   (a) holotype
   (b) genotype
8. How many nucleotides make up a codon?
   (a) one
   (b) two
   (c) three
   (d) four
   (e) five

9. Transcription is the __________.
   (a) manufacture of a strand of RNA complementary to a strand of DNA
   (b) manufacture of two new DNA double helices that are identical to an old DNA double helix
   (c) modification of a strand of RNA prior to the manufacture of a protein
   (d) manufacture of a protein based on information carried by RNA
   (e) manufacture of a new strand of DNA complementary to an old strand of DNA

10. Which of the following enzymes is responsible for RNA synthesis?
    (a) RNase
    (b) RNA gyrase
    (c) RNA helicase
    (d) RNA ligase
    (e) RNA polymerase

11. The correct sequence of events occurring during transcription is __________.
    (a) splicing, capping, tailing
    (b) initiation, elongation, termination
    (c) tailing, capping, splicing
    (d) capping, tailing, splicing
    (e) elongation, initiation, termination

12. What protects mRNA from attack by cellular enzymes?
    (a) the removal of introns
    (b) RNA splicing
    (c) the removal of exons
    (d) the lack of RNA-digesting enzymes in the cytoplasm
    (e) a cap and tail

13. Translation converts the information stored in __________ to __________.
    (a) DNA . . . RNA
    (b) RNA . . . a polypeptide
    (c) protein . . . DNA
    (d) DNA . . . a polypeptide
    (e) RNA . . . DNA

14. The DNA codon AGT codes for an amino acid carried by a tRNA with the anticodon __________.
    (a) UCA
    (b) TCU
    (c) AGU
    (d) TCA
15. What is the correct order of the stages of translation?
   (a) initiation, codon recognition, peptide bond formation, translocation, termination
   (b) initiation, translocation, codon recognition, peptide bond formation, termination
   (c) initiation, codon recognition, translocation, peptide bond formation, termination
   (d) initiation, peptide bond formation, codon recognition, translocation, termination
   (e) initiation, peptide bond formation, translocation, codon recognition, termination

16. A mutation within a gene that will insert a premature stop codon in mRNA would __________.
   (a) result in a polypeptide that is one amino acid shorter than the one produced prior to the mutation
   (b) result in a shortened polypeptide chain
   (c) result in a mis-sense mutation
   (d) change the location at which transcription of the next gene begins
   (e) have the same effect as deleting a single nucleotide in the gene

17. What is the ultimate source of all diversity?
   (a) natural selection
   (b) crossing over
   (c) sexual recombination
   (d) meiosis
   (e) mutation

18. How can bacteriophage DNA be spread from cell to cell without causing cell death?
   (a) by altering the way a cell splices its RNA
   (b) via a lytic cycle
   (c) via a Calvin cycle
   (d) via a lysogenic cycle
   (e) by altering its DNA

19. A(n) __________ is to bacteria as a __________ is to animal cells.
   (a) provirus . . . phage
   (b) retrovirus . . . virus
   (c) phage . . . prophage
   (d) prophage . . . provirus
   (e) RNA virus . . . DNA virus

20. The figure below shows the flow of genetic information in a eukaryotic cell. The transfer of information from DNA into an RNA molecule is known as __________.
   (a) DNA replication
   (b) transcription
   (c) polypeptide
   (d) translation
   (e) a gene
21. Consider the following figure. It indicates that a single amino acid substitution __________.
(a) always involves adenine and uracil
(b) may alter a protein so that it no longer functions properly
(c) is a silent mutation
(d) causes a nonsense mutation
(e) prevents codon recognition

Please read the following scenario to answer the following questions.

If you were asked to study the pattern of bacterial growth (increase in numbers over time) during an infection, you would find that numbers of bacteria increase exponentially up to a certain point. Assume that you have been asked to interpret the growth of bacteriophages. You infect the host bacteria and measure the increase of phages over a defined period of time. You plot the results and get the graph shown here.
22. Once viruses are detected, the number of viruses increases rapidly. This is because __________.
   (a) bacterial viruses are released slowly from the host cells
   (b) lysogeny produces large numbers of bacteriophages
   (c) DNA viruses reproduce more rapidly than RNA viruses
   (d) the host cell speeds the release process
   (e) the viruses lyse the hosts to release mature viruses all at once

Please read the following scenario to answer the following questions.

While working with cultured mouse cells, a researcher unknowingly treated the cells with a mutagen that causes the deletion or insertion of individual nucleotides in DNA. Subsequently, she isolated and cultured a single cell from this group. She noticed that the progeny of this cell were not producing a certain protein and that this affected their survival.

23. The mutation would be most harmful to the cells if it resulted in __________.
   (a) a single nucleotide insertion near the start of the coding sequence
   (b) a single nucleotide deletion near the end of the coding sequence
   (c) a single nucleotide in the middle of an intron
   (d) substitution of a base pair
   (e) deletion of a triplet near the middle of the gene