TEST 2 - MIDTERM
GENETICS, PCB 3063-U03
November 8, 2010

1. Which statement is true about plasmids?

a. They are composed of RNA
b. They replicate independently of bacterial chromosomes
c. They are composed of only single stranded DNA
d. They replicate outside of bacterial cells

2. Which process of DNA transfer in bacteria requires virus?

a. Conjugation
b. Transformation
c. Transduction
d. All of the above

3. Plasmids do not have to integrate into the host cell chromosome in order to be replicated

b. False

4. A bacterial cell transfers chromosomal genes to F^- cells, but it rarely causes them to become F^-. The bacterial cell is

a. Hfr
b. Lysogenic
c. Auxtrophic
d. Lytic

5. *Leu*$^-$ bacteria are mixed in a flask with *leu*$^+$ bacteria, and soon all bacteria are *leu*$^+$. However, if the *leu*$^-$ cells are on one side of a U-tube and the *leu*$^+$ cells are on the other, the *leu*$^-$ cells do not become prototrophic. This suggests

a. Conjugation
b. Transduction
c. Transformation

6. Conjugation between an F^+ and F^- cell usually results in

a. Two F^-
c. An F^+ and an F^- cell
d. An Hfr cell and an F^- cell

7. In which bacteriophage life cycle does the phage DNA become incorporated into the bacterila chromosome?

a. Lytic
b. Lysogenic
c. Neither lytic or lysogenic
d. Both, lytic and lysogenic

8. Two different strains of a mutant phage infect a single bacterium. One phage strain is *d*$^-$ and the other is *e*$^-$. Some of the progeny phages are genotype *d*$^-$*e*$^+$, and some are *d*$^-$*e*$^-$. What genetic phenomenon does this demonstrate?

a. complementation
b. specialized transduction
c. generalized transduction
d. recombination

9. **What does the enzyme reverse transcriptase do?**
   a. Using the amino acid sequence of a protein as a template, it makes an RNA molecule.
   b. Using RNA as a template, it makes a DNA molecule.
   c. Using RNA as a template, it makes an RNA molecule.
   d. Using DNA as a template, it makes an RNA molecule

10. **The typical genome of a retrovirus contains:**
   a. *gag* and *env*
   b. *pol, tat, and rev*
   c. *pol, tat*, and *env*
   d. *gag, pol*, and *env*

11. **Antibiotic resistance can be transferred from one bacterial cell to another by conjugation**
   a. True
   b. False

12. **All retroviruses contain oncogenes**
   a. True
   b. False

13. **Cotransformation between two genes is more likely if they are:**
   a. close to one another.
   b. far apart from one another.
   c. both next to the F factor.
   d. both oriented in the same direction

14. **Which of the following is NOT characteristic of A-form DNA compared to B- or Z-form DNA?**
   a. has right-handed helixes
   b. has 11 bases per turn
   c. is long and narrow
   d. has 50% purines, 50% pyrimidines
   e. has a 32.7° rotation per base pair

15. **Which of these sequences could form a hairpin?**
   a. 5′ GGGGTTTTCCCC 3′
   b. 5′ AAAAAAAAAAAA 3′
   c. 5′ ACACACACACAC 3′
   d. 5′ TTTTTTCCCCCC 3′

16. **Ribose sugars have a hydroxyl on the 2′ carbon**
   a. True
   b. False

17. **A-, B-, and Z-form DNA are all right-handed helixes**
   a. True
   b. False

18. **Which of these sequences, if paired with its complementary strand, would be a palindrome?**
   a. 5′ CCCCCC 3′
   b. 5′ CCCGGG 3′
   c. 5′ CTGCTG 3′
   d. 5′ TCCCCT 3′

19. **If a DNA molecule is 30% cytosine (C), what is the percentage of guanine (G)?**
   a. 30%
   b. 60%
   c. 35%
   d. 70%

20. **The bonds that connect nucleotides in a strand are called**
    a. hydrogen
    b. peptide
    c. phosphatase
    [redacted]

21. **The antiparallel nature of DNA refers to**
    a. Its charged phosphate groups
    b. The pairing of bases
    c. The formation of hydrogen bonds between bases
    [redacted] The opposite direction of the two strands of nucleotides

22. **Bacterial DNA is stabilized by histone proteins**
    a. True
    [redacted]

23. **A DNA molecule 500 bp long has 60 complete rotations. This DNA molecule is**
    a. Relaxed
    b. Negatively supercoiled
    [redacted]

24. **Neutralizing their positive charge would have which effect on the histone proteins?**
    a. They would bind DNA tighter
    b. They would cause supercoiling
    [redacted] hey would separate from the DNA
    d. They would be attracted to each other

25. **How many copies of the H3 histone would be found in chromatin containing 100 nucleosomes?**
    [redacted]
    b. 100
    c. 50
    d. 5

26. **Centromeres and telomeres encode special gene products**
    a. True
    [redacted]

27. **What is the function of a telomere?**
    a. Coding for a protein
    b. Providing the attachment for kinetochor
    [redacted] tabilizing the end of a chromosome
    d. Attracting transcription machinery

28. **Most of the genes that encodes proteins are found in**
    a. Moderately repetitive DNA
    b. Highly repetitive DNA
    [redacted] ence DNA
    d. All of the above

29. **It is estimated that transposable elements compose approximately what percent of the human genome:**
    a. <1
    b. 1
    c. 10
    [redacted]
    e. 99

30. Copies of a gene that arose by gene duplication are part of a gene _____
a. complex
[redacted]
c. tandemoplex
d. structure
e. chromosome

31. Retrotransposons are transcribed before moving from one location in the genome to another
[redacted]
b. False

32. Which type of transposable elements contain terminal inverted repeats?
a. Insertion sequences
b. Composite transposomes
c. Non-composite transposomes
[redacted]

33. Transposons and insertion sequences are flanked by indirect repeats
[redacted]
b. False

34. The "selfish DNA hypothesis" holds that transposons persist in genomes because of their mutagenic capacity
a. True
[redacted]

35. Which type of replication requires a brake in the nucleotide strand to get started?
a. Theta replication
b. Linear eukaryotic replication
[redacted] Rolling-circle replication
d. All of the above

36. Both eukaryotes and prokaryotes typically have only one origin of replication.
a. True
[redacted]

37. DNA synthesis during replication is initiated from
[redacted]
b. DNA primers
c. Either DNA or RNA primers

38. Single-strand-binding proteins prevent DNA polymerase from entering a replication initiation site.
a. True
[redacted]

39. Telomeres are _____ DNA sequences located at the ends of eukaryotic chromosomes
a. Inverted
b. Discontinuously repeated
c. Positively charged
[redacted] Tandemly repeated

40. Okazaki fragments are involved in both lagging and leading DNA strand synthesis
a. True
[redacted] False

41. Eukaryotic cells use the same DNA polymerase to replicate mitochondrial, chloroplast, and nuclear DNA
a. True
[redacted]

52. **What is the difference between the core promoter and the regulatory promoter?**
   a. Only the core promoter has consensus sequences
   b. The core promoter is upstream and regulatory promoter is downstream of the gene
   c. [redacted]anscription factors bind to the core promoter and transcriptional activator proteins bind to the [redacted]regulatory promoter
   d. All of the above

53. **The 5′ and 3′ untranslated regions (UTRs) of processed mRNA molecules are derived from introns**
   a. True
   b. [redacted]

54. **Eukaryotic gene and protein sequences are generally collinear**
   a. True
   b. [redacted]

55. **Alternative 3' cleavage sites result in**
   a. Multiple genes of different lengths
   b. multiple pre-mRNA of different lengths
   c. [redacted]
   d. all of the above

messenger RNA.

5' [redacted]CGC[redacted] 3'

transcription of mRNA genes.

TATA Bends and partialy unwinds DNA

DNA lacks free hydroxyl group.

In all organisms, all gene are transcribed from the same strand.
FALSE

A promoter is a sequence where DNA replication is initiated.
FASE

In both eukary & prokar, transcriptions of mRNA
FALSE

Initiation of transcription does not require [redacted]
True.