Chapter 13 Review

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. Sticky ends
   a. are produced by the action of all restriction enzymes.
   b. form associations with complementary DNA that are very stable.
   c. are the result of staggered cuts of DNA by restriction enzymes.
   d. must interact with each other in the formation of recombinant DNA.
   e. have non-specific base sequences.

2. Restriction enzymes
   a. cleave DNA at sequence-specific sites.
   b. are called restriction enzymes because they restrict the range of viruses that can attack a bacterial species.
   c. do not cut the host bacterium DNA.
   d. are essential tools in molecular biology.
   e. All of the above

3. Restriction enzymes
   a. cut single-stranded DNA.
   b. cut double-stranded DNA at any palindromic sequence.
   c. cleave DNA to very small pieces.
   d. cleave double-stranded DNA at specific palindromic sequences.
   e. have been isolated from just a few species of microorganisms.

4. In gel electrophoresis of DNA fragments,
   a. the fragments migrate towards the cathode (negative charge).
   b. the fragments are separated based on their charge differences.
   c. the fragments are separated on the basis of their sizes.
   d. the fragments migrate towards the anode (positive charge) because of the positive charge of the bases.
   e. large fragments migrate more quickly than small fragments.

5. The function of DNA ligase in the generation of recombinant DNA is to
   a. cut DNA.
   b. replicate DNA.
   c. unwind DNA.
   d. join DNA fragments by the formation of phosphodiester bonds.
   e. join DNA fragments noncovalently.

6. Which of the following statements about bacterial antibiotic resistance genes is false?
   a. They are usually present in the bacterial large circular genome.
   b. They were used by Cohen and Boyer in their first recombinant DNA experiments.
   c. They are convenient selectable markers.
   d. They can confer antibiotic resistance to other prokaryotes.
   e. They are importance to medicine.
7. A host cell or organism that contains recombinant DNA is referred to as a _______ cell or organism.
   a. transfected
   b. transformed
   c. transgenic
   d. chimeric
   e. selectable

8. A plasmid
   a. is the bacterial genome.
   b. is a small, circular double-stranded DNA molecule that replicates autonomously.
   c. is only recombinant.
   d. does not code for proteins.
   e. is double-stranded RNA.

9. To replicate within the cells of a host, recombinant DNA must either _______ into the host’s genome or contain a(n) _______. Otherwise the recombinant DNA would not be replicated, since _______ requires specific sequences to bind to DNA.
   a. integrate; origin of replication; DNA polymerase
   b. integrate; vector; DNA polymerase
   c. recombine; origin of replication; DNA ligase
   d. recombine; stop transcription signal; DNA polymerase
   e. integrate; stop transcription signal; DNA ligase

10. In recombinant DNA technology, _______ may be used as a selectable marker or reporter gene.
    a. lacZ
    b. the GFP gene
    c. tet‘
    d. amp‘
    e. All of the above

11. The Ti plasmid
    a. is derived from E. coli.
    b. replicates in host cells.
    c. is useful in introducing foreign DNA into yeasts.
    d. is useful in introducing foreign DNA into plants.
    e. is of viral origin.

12. cDNA libraries
    a. are the same as genomic libraries.
    b. include DNA from non-coding sequences.
    c. require DNA polymerase to generate.
    d. require reverse transcriptase to generate.
    e. likely contain all protein-coding genes.
13. What information would you need to design a synthetic gene for a protein to be translated in yeast?
   a. Primary structure of the protein and the genetic code
   b. Primary structure and secondary structure of the protein, and the genetic code
   c. Primary structure of the protein, the genetic code, and promoter sequence
   d. Secondary structure of the protein, the genetic code, and promoter sequence
   e. Primary structure of the protein and promoter sequence

14. Complementary RNA
   a. inhibits transcription.
   b. forms hybrids with mRNA to prevent translation.
   c. blocks DNA replication.
   d. is sense RNA.
   e. blocks translation by joining with rRNA.

15. The RNA in RNAi (RNA interference) is
   a. single stranded.
   b. not made in vivo.
   c. relatively stable in cells.
   d. capable of binding to specific mRNAs.
   e. Both c and d

16. DNA microarrays
   a. are used to analyze genomic DNA.
   b. determine genes that are transcribed.
   c. use oligoribonucleotides as probes.
   d. probe noncoding regions of DNA.
   e. detect proteins that are translated.

17. Biotechnology may perhaps best be described as
   a. a branch of the science of molecular biology.
   b. its own scientific discipline.
   c. a collection of approaches to the exploitation of living systems to make useful products.
   d. an industry to make products useful to medicine.
   e. an industry to make products useful to agriculture.

18. Recombinant DNA technology is least applicable to which of the following approaches?
   a. The analysis of traits determined by multiple genes
   b. Overexpression of a particular gene
   c. Silencing a particular gene
   d. Knocking out a particular gene
   e. Targeting a protein to the nucleus

19. Suppose that you wanted to express a protein from animal cells using recombinant DNA technology. Why might you prefer to use yeast as the host rather than E. coli?
   a. Posttranslational protein processing in yeasts is similar to that in animals.
   b. Yeast is a multicellular organism.
   c. Yeast has a smaller genome than E. coli.
   d. Yeast is a prokaryote.
   e. Yeast is easier to cultivate than the bacterium.
Recombinant DNA technology has produced medically useful products. Most of these products are ______ that are normally present in low amounts in animals and are difficult to ______: ______ vectors are used to obtain these products in large amounts.

a. hormones; purify; expression
b. proteins; purify; expression
c. hormones; detect; plasmid
d. proteins; detect; plasmid
e. proteins; purify; plasmid

_____ 21. ______ is the production of pharmaceuticals in farm animals or plants.

a. Pharming
b. Fishing
c. Quality control
d. Manufacturing
e. Gene expression

_____ 22. The use of biotechnological approaches for the improvement of crop plants has been more controversial than their use to prepare medically useful products. Why?

a. People eat food that could contain transgenes.
b. Crops are grown outside, and there is a chance that a transgene could escape to other organisms.
c. Herbicide-resistance could spread to weed species.
d. Beneficial insects could be harmed by plants expressing the BT toxin.
e. All of the above