

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) How do we describe transformation in bacteria? 1) _____
 - A) the infection of cells by a phage DNA molecule
 - B) assimilation of external DNA into a cell
 - C) the creation of a strand of RNA from a DNA molecule
 - D) the creation of a strand of DNA from an RNA molecule
 - E) the type of semiconservative replication shown by DNA

- 2) In trying to determine whether DNA or protein is the genetic material, Hershey and Chase made use of which of the following facts? 2) _____
 - A) DNA contains sulfur, whereas protein does not.
 - B) DNA contains phosphorus, whereas protein does not.
 - C) DNA contains nitrogen, whereas protein does not.
 - D) RNA includes ribose, whereas DNA includes deoxyribose sugars.
 - E) DNA contains purines, whereas protein includes pyrimidines.

- 3) Cytosine makes up 42% of the nucleotides in a sample of DNA from an organism. Approximately what percentage of the nucleotides in this sample will be thymine? 3) _____
 - A) 31%
 - B) 8%
 - C) 42%
 - D) 16%
 - E) It cannot be determined from the information provided.

- 4) Which of the following statements describes chromatin? 4) _____
 - A) Heterochromatin is highly condensed, whereas euchromatin is less compact.
 - B) Heterochromatin is composed of DNA, whereas euchromatin is made of DNA and RNA.
 - C) Only euchromatin is visible under the light microscope.
 - D) Both heterochromatin and euchromatin are found in the cytoplasm.
 - E) Euchromatin is not transcribed, whereas heterochromatin is transcribed.

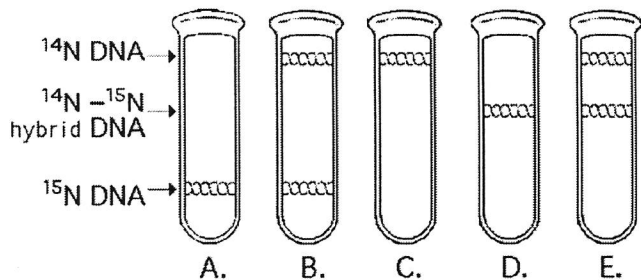


Figure 13.1

- 5) In the late 1950s, Meselson and Stahl grew bacteria in a medium containing "heavy" nitrogen (^{15}N) and then transferred them to a medium containing ^{14}N . Which of the results in Figure 13.1 would be expected after one round of DNA replication in the presence of ^{14}N ? 5) _____
 - A) A
 - B) B
 - C) C
 - D) D
 - E) E

- 6) In his work with pneumonia-causing bacteria and mice, Griffith found that 6) _____
A) the protein coat from pathogenic cells was able to transform nonpathogenic cells.
B) bacteriophages injected DNA into bacteria
C) some substance from pathogenic cells was transferred to nonpathogenic cells, making them pathogenic.
D) heat-killed pathogenic cells caused pneumonia.
E) the polysaccharide coat of bacteria caused pneumonia.
- 7) Which of the following provides some evidence that RNA probably evolved before DNA? 7) _____
A) RNA polymerase makes a single-stranded molecule.
B) RNA polymerase does not require localized unwinding of the DNA.
C) RNA polymerase uses DNA as a template.
D) DNA polymerase has proofreading function.
E) DNA polymerase uses primer, usually made of RNA.
- 8) Which of the following best describes the significance of the TATA box in eukaryotic promoters? 8) _____
A) Its significance has not yet been determined.
B) It sets the reading frame of the mRNA.
C) It prevents supercoiling of the DNA near the start site.
D) It is the recognition site for a specific transcription factor.
E) It is the recognition site for ribosomal binding.
- 9) Alternative RNA splicing 9) _____
A) increases the rate of transcription.
B) is a mechanism for increasing the rate of transcription.
C) can allow the production of similar proteins from different RNAs.
D) can allow the production of proteins of different sizes and functions from a single mRNA.
E) is due to the presence or absence of particular snRNPs.
- 10) A particular triplet of bases in the coding sequence of DNA is AAA. The anticodon on the tRNA that binds the mRNA codon is 10) _____
A) TTT.
B) UUU.
C) UUA.
D) AAA.
E) either UAA or TAA, depending on first base wobble.
- 11) When the ribosome reaches a stop codon on the mRNA, no corresponding tRNA enters the A site. If the translation reaction were to be experimentally stopped at this point, which of the following would you be able to isolate? 11) _____
A) separated ribosomal subunits, a polypeptide, and free tRNA
B) an assembled ribosome with a separated polypeptide
C) separated ribosomal subunits with a polypeptide attached to the tRNA
D) a cell with fewer ribosomes
E) an assembled ribosome with a polypeptide attached to the tRNA in the P site

- 12) What is the effect of a nonsense mutation in a gene? 12) _____
- A) It changes an amino acid in the encoded protein.
 - B) It prevents introns from being excised.
 - C) It has no effect on the amino acid sequence of the encoded protein.
 - D) It alters the reading frame of the mRNA.
 - E) It introduces a premature stop codon into the mRNA.

The following information should be used for the next few questions.

A part of an mRNA molecule with the following sequence is being read by a ribosome: 5' CCG – ACG 3' (mRNA). The charged transfer RNA molecules shown in Figure 14.4 (with their anticodons shown in the 3' to 5' direction) are available. Two of them can correctly match the mRNA so that a dipeptide can form.

tRNA Anticodon	Amino Acid
GGC	Proline
CGU	Alanine
UGC	Threonine
CCG	Glycine
ACG	Cysteine
CGG	Alanine

Figure 14.4

- 13) The dipeptide that will form will be 13) _____
- A) glycine–cysteine.
 - B) alanine–alanine.
 - C) threonine–glycine.
 - D) proline–threonine.
 - E) cysteine–alanine.

Use the following information to answer the next few questions.

A transfer RNA (#1) attached to the amino acid lysine enters the ribosome. The lysine binds to the growing polypeptide on the other tRNA (#2) already in the ribosome.

- 14) Where does tRNA #2 move to after this bonding of lysine to the polypeptide? 14) _____
- A) P site
 - B) directly to the cytosol
 - C) exit tunnel
 - D) A site
 - E) E site
- 15) The tryptophan operon is a repressible operon that is 15) _____
- A) turned on only when glucose is present in the growth medium.
 - B) permanently turned on.
 - C) turned on only when tryptophan is present in the growth medium.
 - D) turned off only when glucose is present in the growth medium.
 - E) turned off whenever tryptophan is added to the growth medium.

- 16) Transcription of the structural genes in an inducible operon 16) _____
A) starts when the pathway's product is present.
B) occurs continuously in the cell.
C) starts when the pathway's substrate is present.
D) does not result in the production of enzymes.
E) stops when the pathway's product is present.
- 17) If you were to observe the activity of methylated DNA, you would expect it to 17) _____
A) be unwinding in preparation for protein synthesis.
B) be replicating nearly continuously.
C) be very actively transcribed and translated.
D) have turned off or slowed down the process of transcription.
E) induce protein synthesis by not allowing repressors to bind to it.
- 18) Steroid hormones produce their effects in cells by 18) _____
A) activating translation of certain mRNAs.
B) binding to intracellular receptors and promoting transcription of specific genes.
C) activating key enzymes in metabolic pathways.
D) promoting the formation of looped domains in certain regions of DNA.
E) promoting the degradation of specific mRNAs.
- 19) Which of the following statements about the DNA in one of your brain cells is true? 19) _____
A) Each gene lies immediately adjacent to an enhancer.
B) Many genes are grouped into operon-like clusters.
C) The majority of genes are likely to be transcribed.
D) Most of the DNA codes for protein.
E) It is the same as the DNA in one of your kidney cells.
- 20) Which of the following is characteristic of the lytic cycle? 20) _____
A) A large number of phages are released at a time.
B) Many bacterial cells containing viral DNA are produced.
C) The virus-host relationship usually lasts for generations.
D) Viral DNA is incorporated into the host genome.
E) The viral genome replicates without destroying the host.
- 21) Which of the following statements describes the lysogenic cycle of lambda (λ) phage? 21) _____
A) Most of the prophage genes are activated by the product of a particular prophage gene.
B) The phage DNA is incorporated by crossing over into any nonspecific site on the host cell's DNA.
C) Certain environmental triggers can cause the phage to exit the host genome, switching from the lytic to the lysogenic.
D) The phage genome replicates along with the host genome.
E) After infection, the viral genes immediately turn the host cell into a lambda-producing factory, and the host cell then lyses.
- 22) Which viruses have single-stranded RNA that acts as a template for DNA synthesis? 22) _____
A) proviruses
B) viroids
C) lytic phages
D) bacteriophages
E) retroviruses