※ 注意：請用 2B 鉛筆作答於答案卡，並先詳閱答案卡上之「畫記說明」。

單選題，共 40 題，每題 2.5 分。考生應作答於答案卡。

1. The anticodon of a particular tRNA molecule is
(A) complementary to the corresponding mRNA codon
(B) complementary to the corresponding triplet in rRNA
(C) the part of tRNA that binds to a specific amino acid
(D) changeable, depending on the amino acid that attaches to the tRNA

2. Which of the following structures is exclusively found in eukaryotic cells?
(A) Plasma membrane
(B) Lysosome
(C) Chromosome
(D) Ribosome

3. Which of the following groups of living organisms has the highest variation in haploid genome size?
(A) Mammals
(B) Fish
(C) Fungi
(D) Protozoa
(E) Prokaryotes

4. Which of the following pairs of amino acid residues would you expect to form ionic bonds?
(A) Glutamic acid and glutamine
(B) Arginine and lysine
(C) Lysine and glutamic acid
(D) Tryptophan and tyrosine

5. A protein consisting of a single 3000 amino acid polypeptide chain is almost certainly …
(A) extracellular.
(B) globular.
(C) multidomain.
(D) composed of mostly α-helical regions.

6. Which chemical eliminates disulfide bonds in a purified protein?
(A) NaCl, a salt
(B) DTT, a reducing agent
(C) H2O2, an oxidizing reagent
(D) SDS, an ionic detergent and denaturing agent

7. Which of the following statements regarding chromatin remodeling complexes is correct?
(A) can slide nucleosomes on DNA.
(B) have ATPase activity.
(C) interact with histone chaperones.

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(D) can remove or exchange core histone subunits.
(E) All of the above.

8. The acetylation of lysines on the histone tails …
(A) loosens chromatin structure by adding positive charges to histones.
(B) recruits the heterochromatin protein HP1, resulting in the establishment of heterochromatin.
(C) can be performed on methylated lysines only after they are first demethylated.
(D) is a covalent modification and is thus irreversible.

9. Which of the following repair pathways can accurately repair a double-strand break?
(A) Base excision repair
(B) Nucleotide excision repair
(C) Direct chemical reversal
(D) Homologous recombination

10. On the ribosome, the mRNA is read from ..., and the polypeptide chain is synthesized from...
(A) 5' to 3'; C- to N-terminus.
(B) 5' to 3'; N- to C-terminus.
(C) 3' to 5'; C- to N-terminus.
(D) 3' to 5'; N- to C-terminus.

11. Which of the following nucleotides is hydrolyzed in both transcription and translation elongation?
(A) ATP
(B) GTP
(C) TTP
(D) CTP

12. Which of the following classes of noncoding RNAs is NOT directly involved in RNA interference?
(A) miRNA
(B) snoRNA
(C) piRNA
(D) siRNA

13. Which chromatography method resembles immunoprecipitation for protein purification?
(A) Ion-exchange chromatography
(B) Gel-filtration chromatography
(C) Hydrophobic interaction chromatography
(D) Affinity chromatography

14. Which of the following statements about proteins in SDS-PAGE is TRUE?
(A) The proteins are unfolded while being separated.
(B) The proteins are separated by size, mostly independent of their native charge.
(C) Large proteins move more slowly.

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(D) An ionic detergent is used.
(E) All of the above.

15. Which mass spectrometer is best for identifying all proteins in an organelle?
(A) MALDI-TOF
(B) MS/MS
(C) LC-MS/MS
(D) GC-MS

16. For a complementation test to work, the mutations under study must be…
(A) recessive.
(B) dominant.
(C) gain-of-function.
(D) null.

17. What is the typical thickness of a lipid bilayer such as the plasma membrane of our cells?
(A) 0.5 nm
(B) 5 nm
(C) 50 nm
(D) 100 nm

18. Side chains of amino acids
(A) are all nonpolar
(B) are nonpolar if they contain N or S
(C) are all polar
(D) may be polar or nonpolar

19. A polypeptide contains 100 amino acids. How many peptide bonds does it have?
(A) 101
(B) 100
(C) 99
(D) 98

20. Amino acids are acids because they always possess which functional group?
(A) carboxyl
(B) amino
(C) hydroxyl
(D) phosphate

21. If cells are grown in a medium containing radioactive $^{35}S$, which of these molecules will be labeled?
(A) phospholipids
(B) nucleic acids
(C) proteins

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(D) amylose

22. If a double-stranded DNA sample were composed of 20% guanine, what is the percentage of adenine?
(A) 30
(B) 40
(C) 50
(D) 60

23. If one DNA strand is 5'-ATTGCA-3', what is the complementary strand?
(A) 5'-TAACGT-3'
(B) 5'-TGCAAT-3'
(C) 5'-ACGTTA-3'
(D) 5'-ATTGCA-3'

24. Compare proteins to nucleic acids. Which of the following is TRUE?
(A) Both have primary and secondary structure.
(B) Both contain sulfur.
(C) Both are used as templates to synthesize polymers
(D) Both have monomers, which contain phosphorus.

25. Phospholipids and triglycerides both
(A) contain serine or some other organic compound
(B) have three fatty acids
(C) have a glycerol backbone
(D) have a phosphate

26. Which of the following factors would tend to increase membrane fluidity?
(A) a greater proportion of unsaturated phospholipids
(B) a greater proportion of saturated phospholipids
(C) a lower temperature
(D) a relatively high protein content in the membrane

27. Which of the following types of molecules are the major structural components of the cell membrane?
(A) phospholipids and cellulose
(B) nucleic acids and proteins
(C) phospholipids and proteins
(D) proteins and cellulose

28. In eukaryotic cells, chromosomes are composed of
(A) DNA and RNA
(B) DNA and proteins
(C) DNA only
(D) DNA and phospholipids

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29. If a cell has accumulated DNA damage, it is unlikely to
(A) pass the G2 checkpoint
(B) activate DNA repair mechanisms
(C) enter G1 from mitosis
(D) synthesize cyclin-dependent kinases

30. What is a telomere?
(A) the mechanism that holds two sister chromatids together
(B) DNA replication during telophase
(C) the site of origin of DNA replication
(D) the ends of linear chromosomes

31. Which of the following is NOT synthesized from a DNA template?
(A) messenger RNA
(B) amino acids
(C) transfer RNA
(D) ribosomal RNA

32. Genotype is to _____ as phenotype is to _____.
(A) DNA base sequence; physical traits that are products of the proteins produced
(B) heredity; DNA base sequence
(C) gene regulation; translation
(D) transcription; amino acid sequence

33. What does it mean when we say the genetic code is redundant?
(A) A single codon can specify the addition of more than one amino acid.
(B) The genetic code is different for different domains of organisms.
(C) The genetic code is universal (the same for all organisms).
(D) More than one codon can specify the addition of the same amino acid.

34. A particular triplet of bases in the template strand of DNA is 5' AGT 3'. What is the corresponding mRNA codon?
(A) 3' UCA 5'
(B) 3' UGS 5'
(C) 5' TCA 3'
(D) 3' ACU 5'

35. Which of the following statements about "a codon" is true?
(A) consists of four nucleotides
(B) can code for up to four different amino acids
(C) extends from one end of a tRNA molecule
(D) is the basic unit of the genetic code

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36. A nonsense mutation in a gene
(A) changes an amino acid in the encoded protein
(B) has no effect on the amino acid sequence of the encoded protein
(C) introduces a premature stop codon into the mRNA
(D) alters the reading frame of the mRNA

37. The greatest expression of the lac operon occurs when lactose levels are
(A) low and glucose levels are high
(B) low and glucose levels are low
(C) high and glucose levels are high
(D) high and glucose levels are low

38. In a bacterial genome, several genes can be grouped to produce a single enzyme. If one of these genes is mutated and the enzyme becomes inactive, then this gene must be part of
(A) an operon
(B) an intron
(C) a repressor
(D) an activator

39. In eukaryotic cells, transcription cannot begin until
(A) the two DNA strands have completely separated and exposed the promoter
(B) several transcription factors have bound to the promoter
(C) the 5' caps are removed from the mRNA
(D) the DNA introns are removed from the template

40. Why are 61 sense codons decoded by only 45 tRNAs?
(A) Some tRNAs have anticodons that recognize 4 or more different codons
(B) The rules for base pairing between the third base of a codon and tRNA are flexible
(C) Many codons are never used, so the tRNAs that recognize them are dispensable
(D) The DNA codes for all 61 tRNAs, but some are then destroyed

試題隨卷繳回