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SIMPLE-CHOICE QUESTIONS 單選題

（Identify the correct statement. Gain two points for each correct question. 每題 2 分）

1. A key group of ~_____ proteins is present in human, yeast, worm, and fly proteomes.
   (A) 3300
   (B) 2300
   (C) 1300
   (D) 300

2. Most organelle genomes are single _____ DNA molecules.
   (A) linear
   (B) circular
   (C) triangle
   (D) irregular

3. Which size (kb) is the animal mitochondrial genome?
   (A) 19-100
   (B) 6-100
   (C) 186-366
   (D) 16-17

4. Which component of the followings is the largest in human genome?
   (A) Exons
   (B) Introns
   (C) Transposons
   (D) Simple repeats

5. Which size (kb) is one unit of eukaryotic replicon?
   (A) 4-10
   (B) 40-100
   (C) 400-1000
   (D) 4000-10000

6. Which subunit of polymerase forms the clamp in DNA replication?
   (A) α
   (B) β
   (C) χ
   (D) δ

（背面仍有題目，請繼續作答）

7. One transition point mutation replaces a G·C pair with _____.
   (A) a C·G
   (B) an A·T
   (C) a T·A
   (D) a G·C

8. Which of the following stages is not one of the three stages of transcription?
   (A) Initiation
   (B) Elongation
   (C) Modification
   (D) Termination

9. Which of the following molecules does not bind to DNA?
   (A) Zinc finger
   (B) Sigma factor
   (C) Steroid hormone receptor
   (D) Rho factor

10. Which of the following descriptions of RNA polymerase is not true?
   (A) Core enzyme is the complex of RNA polymerase subunits needed for transcription.
   (B) Holoenzyme is the complex of four subunits ($\alpha_2\beta\beta'$).
   (C) A loose binding site is any random sequence of DNA that is bound by the RNA polymerase when it is not engaged in transcription.
   (D) Tight binding of RNA polymerase to DNA describes the formation of an open complex (when the strands of DNA have separated).

11. Which of the following eukaryotic promoters does not belong to RNA polymerase II?
   (A) box A
   (B) TATA box
   (C) Inr (initiator)
   (D) DPE (downstream promoter element)

12. Which of the following molecules is involved in RNA splicing?
   (A) snRNA; small nuclear RNAs
   (B) snoRNA; small nucleolar RNAs
   (C) microRNA
   (D) sRNA

13. Which of the following descriptions of regulatory RNA is true?
    (A) RNA functions as a regulator by forming inter-molecular region of secondary structure that changes the properties of a target sequence.
    (B) RNA functions as a regulator by forming intra-molecular region of secondary structure that changes the properties of a target sequence.
    (C) Some terminator proteins (for example TRAP) were activated by substrates to prevent RNA transcription.
    (D) All previous descriptions are true.

14. *E. coli* has several sigma factors, each of which causes RNA polymerase to initiate a set of promoters defined by specific -35 and -10 sequences. Which of the following sigma factors is induced under stress condition?
    (A) σ^{70}
    (B) σ^{S}
    (C) σ^{54}
    (D) σ^{F}

15. Which statement is not correct for the chromosome?
    (A) Chromatin can be divided into euchromatin and heterochromatin.
    (B) Regions of heterochromatin remain densely packed throughout interphase.
    (C) Chromosome generates a series of G-bands by staining with the chemical dye Giemsa.
    (D) G-banding pattern are identical for all chromosome in a particular organism.

16. Which statement is not correct regarding transposon?
    (A) Precise excision describes the removal of a transposon plus one of the duplicated target sequences from the chromosome.
    (B) Imprecise excision occurs when the transposon removes itself form the original insertion site, but leaves behind some of its sequence.
    (C) Homologous recombination between multiple copies of a transposon causes rearrangement of host DNA.
    (D) The frequency of precise excision is much greater than imprecise excision in *E. coli.*

17. Which statement is not correct regarding nonhomologous end joining (NHEJ) pathway?
    (A) Nonhomologous end joining (NHEJ) pathway can ligate blunt ends of duplex DNA.
    (B) Mutations in the NHEJ pathway cause human diseases.
    (C) NHEJ pathway is involved in the recombination of immunoglobulin genes.
    (D) I t is a common system to repair single strand nick.

（背面仍有題目，請繼續作答）

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18. Which statement is not correct regarding DNA recombination?
(A) Somatic DNA recombination is responsible for antibody diversity.
(B) Recombination is initiated by making a double-strand break in DNA duplex.
(C) Double-strand breaks that initiate recombination occur after the synaptonemal complex forms.
(D) *rec*⁻ mutations of *E. coli* cannot undertake general DNA recombination.

19. Which statement is correct regarding to the relationship between replication and histone octamers?
(A) Replication fork passage does not displace histone octamers from DNA strand.
(B) Replication fork passage displaces histone octamers from DNA strand.
(C) Nucelosomes immediately disassembled behind replication fork.
(D) Nucelosomes did not immediately assemble behind replication fork.

20. What modification is not occurred in histone protein?
(A) Methylation.
(B) Phosphorylation.
(C) Acetylation
(D) Esterification

21. Which of the following features is not included in tRNA secondary structure?
(A) acceptor arm
(B) anticodon
(C) Q arm
(D) TΨC arm

22. Termination condons are recongnized by _____ to terminate protein synthesis.
(A) aminoacyl-tRNA
(B) release factor
(C) ribosomal RNA
(D) initiation factor

23. Which event does not commonly happen in apoptotic cell death?
(A) DNA fragmentation
(B) membrane blebbing
(C) chromatin condensed
(D) mRNA degrade

24. Oncogenes are not common code for _____.
    (A) secreted proteins as growth factors
    (B) transmembrane proteins as growth factor receptors
    (C) cytoplasmic proteins as serine/threonine kinases
    (D) nuclear proteins as RNA binding proteins

25. START in yeast cells and the restrict point in animal cells define the time in ____ when a cell makes a commitment to divide.
    (A) G1 phase
    (B) G2 phase
    (C) G0 phase
    (D) M phase

SHORT ESSAY 簡答題（Five points for each question. 每題 5 分）

1. What is gene family?

2. What is neutral mutation?

3. What is ribozyme? Draw a diagram and explain the mechanism.

4. What is *cis*-acting gene and what is *trans*-acting gene?

5. Please explain how to regulate RNA functions by RNA molecules.

6. What are the features of telomere in chromosome?

7. What is the so called "processed pseudogene"? How may it be derived from?

8. Please describe why the eukaryotic mRNA 3' terminus needs to be polyadenylated?

9. What is Shine-Dalgarno sequence? How important is it in controlling protein translation?

(背面仍有題目,請繼續作答)

10. What are tumor suppressors? Please describe how p53 is involved in regulating tumor growth through arresting the cell cycle progression?