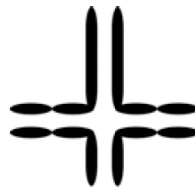


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CONCORSO GEM 2022-2023  
WRITTEN TEST**

**I LIVELLO: BIOLOGY**

**EXAMPLE**

- 1) Which of the following is true of the Polymerase chain Reaction (PCR)?
- (A) It enables a small amount of DNA to be amplified
  - (B) It involves the addition of a poly-A sequence to mRNA
  - (C) It cuts DNA into numerous small fragments for analysis
  - (D) It separates DNA fragments according to size
  - (E) It requires RNA in order to proceed



- 2) During meiosis, homologous chromosomes pair up along their lengths. The most plausible explanation for the karyotype structure shown above is that:
- (A) Portions of non-homologous chromosomes have been translocated
  - (B) One of the two homologous chromosomes has suffered a deletion
  - (C) One of the two homologous chromosomes has undergone an inversion
  - (D) The homologous chromosomes have each suffered a gene duplication
  - (E) One of a pair of homologous chromosomes has been lost via nondisjunction
- 3) Which of the following is NOT a correct statement about the process of meiosis?
- (A) Meiosis I separates chromosomes; meiosis II separates chromatids
  - (B) Synapsis and crossing-over occur during meiosis I
  - (C) Kinetochores are responsible for aligning chromatids during meiosis I
  - (D) Karyokinesis occurs before cytokinesis
  - (E) Segregation of unlinked alleles occurs during meiosis

- 4) Endoplasmic reticulum (ER) is the site of all of the following EXCEPT
- (A) Drug detoxification by means of mixed-function oxidases
  - (B) Synthesis of proteins that are secreted from the cell
  - (C) N-linked glycosylation of newly formed polypeptides
  - (D)  $\text{Ca}^{2+}$  storage in muscles
  - (E) Hydrolytic activities carried out by acid hydrolases
- 5) Exons of a gene are defined as:
- (A) The untranslated regions of the corresponding mRNA
  - (B) Regions in the corresponding mRNA that are involved in initiation of transcription
  - (C) Regions that are not transcribed by RNA polymerase
  - (D) Regions that are excised from the corresponding protein after it is synthesized
  - (E) Regions that remain in the corresponding mRNA after splicing
- 6)  $\text{Ca}^{2+}$  is important in skeletal muscle contraction because it:
- (A) Activates the myosin ATPase by binding to it
  - (B) Binds to troponin to remove a constant inhibition of cross-bridge attachment
  - (C) Prevents the formation of bonds between the myosin cross bridges and the actin filament
  - (D) Is required to detach the myosin head from the actin filament
  - (E) Causes muscle relaxation
- 7) The physiological role of restriction endonucleases is to:
- (A) Allow the *in vitro* construction of recombinant DNA molecules
  - (B) Methylate host DNA
  - (C) Remove RNA primer during DNA synthesis
  - (D) Allow mapping of gene location
  - (E) Cleave foreign DNA molecules that enter the cell
- 8) The amount of genotypic variation in a natural population can be increased by all of the following EXCEPT
- (A) Mutation
  - (B) Recombination
  - (C) Immigration
  - (D) Hybridization
  - (E) Inbreeding

- 9) Which of the following is found in mammals during male gamete formations?
- (A) Two successive centrosome duplications during meiosis
  - (B) Accumulation of yolk during gamete formation
  - (C) Generation of a polar body during meiosis I
  - (D) Formation of 4 functional gametes from a primary germ cell
  - (E) Temporary arrest of meiosis at the metaphase I stage
- 10) A unique property of lysosomal proteins is that they
- (A) Contain a stop-transfer sequence
  - (B) Operate only in an alkaline environment
  - (C) Are enclosed in clathrin-coated vesicles
  - (D) Are phosphorylated on mannose residues
  - (E) Are modified by O-linked glycosylation of asparagine residues