

請依序作答：

1. About base composition in a DNA molecule,
  - (1) A double-stranded DNA molecule is 28% guanosine (G). What is the complete base composition of this molecule? (4 分)
  - (2) In a single-stranded DNA molecule, the amount of G is twice the amount of A, the amount of T is three times the amount of C, and the ratio of pyrimidines to purines is 1.5:1. What is the base composition of the DNA? (4 分)
  
2. In way ways do the transcriptional process and product differ in eukaryotes and prokaryotes? (10 分)
  
3. Please explain the following terms: (每小題 2 分，共 12 分)
  - (1) lampbrush chromosomes
  - (2) PCR
  - (3) lysogenic growth
  - (4) composite transposon
  - (5) proteosome
  - (6) Ti-plasmid
  
4. Please describe the mechanism of “mismatch repair” especially name the proteins involved. (10 分)
  
5. What is the evidence used to determine the length of DNA associated with a nucleosome? What is a nucleosome hypersensitive site? What functions are associated with these sites? What are the higher-order levels of chromatin compaction beside nucleosome leading to the metaphase chromosome? (10 分)
  
6. A red-eyed, long-winged fly is mated with a brown-eyed, long-winged fly. The progeny are: 51 long, red; 18 short, red; 53 long, brown; 16 short, brown. What are the genotype of the parents? (10 分)
  
7. In humans, hemophilia A is an X-linked recessive trait characterized by an abnormality in blood clotting. Albinism is an autosomal recessive trait characterized by the absence of pigment in the skin. A man and woman, both with normal skin pigmentation, have two daughters: one is albino and the other hemophilic. The maternal grandfather had normal blood clotting. The couple plan to have another child. What is the probability that their next child will be: (10 分)
  - a. a son that is normal for both skin pigmentation and blood clotting?
  - b. a daughter that is albino and hemophilic?
  - c. a child that is a carrier for both traits?
  
8. Mice with a single *X* chromosome and no *Y* chromosome (an *XO* sex-chromosome constitution) are fertile females. Assuming that at least one *X* chromosome is required for viability, what sex ratio is expected among surviving progeny from the mating  $XO \text{♀} \times XY \text{♂}$ ? (10 分)
  
9. Define the following terms: (20 分)
 

Dominance	Epistasis	Sex Linkage	Chromosome Translocation	Central dogma
Allele	Locus	Active Y system in sex determination		
Recombinant Frequency		Chromosome theory		

試題隨卷繳回