

1. What is "the chromosome theory of inheritance"? Based on what observation did Boveri and Sutton propose the theory? (10 %)
2. For an individual expressing a dominant trait, how can you tell whether it is a heterozygote or a homozygote? (10 %)
3. Four genes, *A*, *B*, *C*, and *D* are on four different chromosomes. For the diploid individual with the genotype *AA Bb cc Dd*, please describe all the possible allele combinations of the gametes produced, and in what frequencies? (10 %)
4. The *G* and *H* loci are 16 cM apart in humans. If an *Gh / gH* woman mates with an *gh / gh* man and their first child is *Gh / gh*, what is the probability that their second child will be *GH / gh*? (10 %)
5. Two different pure-breeding strains of sweet pea that produce white flowers were crossed to each other. The flowers of the F1 plants were all red, while both red and white flowers were observed in the F2 generation in a 9 red : 7 white ratio. How would you explain these observations? (10 %)
6. What is maternal inheritance? (10 %)
7. What genetic method could be used to show that a trait is controlled by maternal inheritance? (10 %)
8. When a single nucleotide substitution occurred within the protein-coding region of a gene, what are all the possible results? (10 %)
9. If a region within an mRNA has the following sequence: 5'-AAUCCGG-3', what are the corresponding sequences of the coding strand and template strand on DNA, respectively? Please indicate "coding" and "template", and include the 5' and 3' ends in your answer. (10 %)
10. The flower color of a plant is controlled by a single gene. In a population of this plant, there are two alleles for this flower color gene, *D* and *d*. Allele *D* is dominant to allele *d*. If this population is at Hardy-Weinberg equilibrium, and the allele frequency for *D* is 0.6, what are the frequencies for each phenotype, and what are the frequencies for each genotype? (10 %)

試題隨卷繳回