Midterm Review – DNA, Genetics, Biotech

AP Biology

1. Explain how DNA in chromosomes is transmitted to the next generation via meiosis, followed by fertilization.
2. Why is meiosis necessary for sexually reproducing organisms? ? Illustrate via an quantitative example.
3. Make the connection between meiosis, the Law of Segregation, and the genetic diversity necessary for evolution.
4. Compare and contrast: gene-allele genotype-phenotype

2n n=2 multiple alleles-polygenic

diploid-haploid somatic cells – germ cells

pedigree-karyotype mitosis-meiosis

codominance-incomplete dominance

1. State and explain Mendel’s expected ratios in both mono- and dihybrid crosses. How does the genotypes mated in Mendel’s f1 differ from the genotypes used in a test cross? .
2. Why calculate expected probabilities? What part of the scientific method do they represent? What is the role of the chi-square analysis? Know how to calculate and interpret a chi2 value.
3. What is the probability that parents AABb x Aabb will have a child with the genotype AAbb? Solve using multiplication rather than a large Punnett square.
4. How did Morgan’s understanding of the Law of Independent Assortment differ from Mendel’s? What is the role of linkage and crossing over on gene ?
5. Demonstrate how percent recombination can be determined, and used to create a chromosome map.
6. How is gene recombination during meiosis explained? How can recombination during meiosis be utilized to locate genes on chromosomes and establish their relative distances?
7. How does the location of genes on sex chromosomes affect inheritance patterns and the expression of particular phenotypes?
8. Cite skin pigmentation, ABO blood groups, hemophilia, and Huntington’s disease as case examples of different gene/allele interactions.
9. Describe the human genome in terms of size and components. Which parts are most alike between individuals? Which vary more from person to person? Why?
10. What are restriction enzymes? What is their role in DNA technology?
11. What is gel electrophoresis? Why does DNA move through a gel? On what basis is it sorted?
12. Diagram and annotate a gel with wells, lanes, DNA RFLP’s.
13. What are STR’s? How are these sequences used in DNA fingerprinting?