Midterm Review – DNA, Genetics, Biotech

AP Biology

1. Summarize the conclusions of Griffith & Avery, Hershey & Chase, Franklin & Wilkins. Describe the model of DNA proposed by Watson and Crick. How did Franklin’s x-ray image help them?
2. DNA is described as anti-parallel, complementary, and semi-conservative & functions as the genetic code only because of the base pair rule. Explain.
3. Distinguish between the different RNA involved in protein synthesis.
4. Transcribe and translate the DNA segment 3’ TAC CCT AAA TAG CAT 5’
5. code is redundant but not ambiguous – explain.
6. What are the two divisions of the cell cycle? How is each subdivided? During which is each of the following occuring?

 DNA is replicated Cell undergoes protein synthesis

 DNA as chromatin DNA as chromosomes

 Cyclin production begins MPF builds up

 Cytokinesis Sister chromatids present

 Organelles replicated Cell grows in size

1. Explain how DNA in chromosomes is transmitted to the next generation via mitosis, or meiosis, followed by fertilization.
2. How is the cell cycle controlled? What happens when control is lost? Incorporate growth factors, cyclin, CDK, MPF, and density dependent inhibition in your answer.
3. Why is meiosis necessary for sexually reproducing organisms? ? Illustrate via an quantitative example.
4. Make the connection between meiosis and the genetic diversity necessary for evolution.
5. 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. Explain the mating in both a test cross and a back 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 do the events of meiosis, including the laws of segregation and independent assortment, explain the observations of Gregor Mendel? Of Thomas Morgan?
5. How can recombination during meiosis be explained? How can recombination during meiosis be utilized to locate genes on chromosomes and establish their relative distances?
6. How does the location of genes on sex chromosomes affect inheritance patterns and the expression of particular phenotypes?
7. Cite skin pigmentation, ABO blood groups, hemophilia, and Huntingtons disease as case examples of gene/allele interactions.
8. 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?
9. What are restriction enzymes? What is their role in creating recombinant DNA?
10. How are plasmids used as vectors for genes, and in the creation of transgenic organisms?
11. What is gel electrophoresis? Why does DNA move through a gel? On what basis is it sorted?