

UNIT 6 REVIEW

A.) DNA Structure

1. What group of organic compounds does DNA belong to?
2. What are the building blocks of DNA?
3. Why is DNA considered an antiparallel molecule?
4. Name the bonds that hold the sugar phosphate backbone together
5. Name the four nitrogenous bases found in DNA
6. Which are “purines”? Which are “pyrimidines”?
7. What are the base pairing rules in DNA?
8. Explain what is meant by the 3' and 5' ends of the DNA molecule
9. What is the basic shape a DNA molecule? Discovered by? When?
10. Explain the significance of Griffith's Experiment
11. Explain the significance of Hershey and Chase's Experiment

B.) DNA Replication

12. Define “DNA Replication”
13. Why is DNA Replication considered a semiconservative process?
14. Why is DNA Replication important to living organisms?
15. Name the enzyme that uncoils the double helix
16. Name the enzyme that releases tension at the replication fork
17. Name the enzyme that attaches free nucleotides to the parent stands
18. Explain how replication of the lagging strand is different from replication of the leading strand.
19. Name the enzyme that seals Okazaki Fragments together

20. Name the enzyme that coils up the double helix after replication is complete
21. During which phase of the cell cycle does DNA replication occur?
22. What is a telomere?
23. Why do telomeres become shorter after each replication?
24. Why are telomeres so important in maintaining a species?
25. Describe 3 ways in which DNA can repair mistakes

C.) From Gene to Protein (Protein Synthesis)

26. Describe 4 differences between RNA and DNA
27. Why is DNA considered the “Code of Life”?
28. Protein Synthesis consists of 2 main processes. What are they?
29. Describe all three steps of Transcription (initiation/elongation/termination)
30. Where in the cell does Transcription take place? Why?
31. Describe all 3 steps of RNA processing
32. Why is the GTP cap important? (two reasons)
33. Why is the Poly-A-Tail important (two reasons)
34. Describe all three steps of Translation (initiation/elongation/termination)
35. Why is DNA is considered a “Universal Code”?

D.) Mutations

36. Define Mutation
37. Describe and give examples of the different types of mutations
38. What is a “frame-shift” and which mutations have this result?
39. Why is it that a protein may NOT be altered from a mutation?
40. What is a mutagenic agent (mutagen) and what are some examples?
41. When is a mutation inheritable?

E.) The Viral Genome

42. Why are viruses an exception to the Cell Theory?
43. Label the parts of a virus
44. Describe the Lytic Cycle
45. Describe the Lysogenic Cycle
46. What is the function of Reverse Transcriptase
47. HIV is an example of a retrovirus. What does this mean?

F.) The Bacterial Genome

48. How is DNA organized in prokaryotes?
49. Describe the three ways in which variation is introduced into prokaryotes
50. What is an operon? What is its structure?
51. How is an inducible operon different from a repressible operon? How is each an example of regulation?

G.) The Eukaryotic Genome

52. How is DNA organized in eukaryotes?
53. What is the difference between histones and nucleosomes?
54. What is the difference between Euchromatin and Heterochromatin?
55. Which type of chromatin can be replicated and or transcribed? Why?
56. List and describe the levels of Gene Regulation in Eukaryotes.

H.) Biotechnology

57. Define Genetic Engineering
58. What are restriction enzymes? How are they named? Where do they come from?
59. Explain how Recombinant DNA is made

60. Describe the process of Gene Cloning.
61. Describe a useful application of Gene Cloning
62. Describe the process of Gel Electrophoresis (DNA Sequencing
63. What are “jumping genes” (transposons)?
64. Why are transposable elements considered mutations?
65. What is Southern Blotting and why is it used?
66. What is the PCR (polymerase chain reaction) and why is it used?
67. What percentage of Human DNA actually codes for proteins?
68. Describe the process of Gene Therapy.