DNA Structure and Chemistry: Points to consider

1. What constitutes the backbone of the double helix?
2. What is the type of linkage between the sugar and phosphate?
3. What is the nature of the sugar?
4. Which carbon atoms of the sugar are involved in covalent bonding with the phosphate group?
5. What is the nature of the linkage between the sugar and the base? Which sugar atom is involved in this bonding? Which atoms of the purine and pyrimidine bases are involved in glycosidic linkage with ribose?
6. How many hydrogen bonds are formed between adenine and thymine? Which atoms are involved in the hydrogen bonding?
7. How many hydrogen bonds are formed between guanine and cytosine? Which atoms are involved in the hydrogen bonding?
8. How do you define major and minor grooves in B-form DNA?
9. Which of the two grooves, major or minor, provides greater discrimination of a given base pair through hydrogen bonding contacts?
10. What is the handedness of B form double helical DNA?
11. What is the handedness of the helix in Z-form DNA? How does Z-DNA acquire the altered helical configuration?
12. Is the B form double helix paranemic or plectonemic?
13. What is the diameter of B-form DNA?
14. How many base pairs are there per turn of DNA in the B-form double helix?
15. What is the distance between two adjacent base pairs in B-form DNA?
16. Are the base pairs planar or tilted with respect to each other?
17. What is the nature of the sugar pucker in B form DNA?
18. Are the bases in the *syn* or *anti* configuration in B-form DNA?
19. What are the chemical forces that contribute to the structural stability of DNA?
20. Which of the two types of forces, hydrogen bonding or hydrophobic interactions, more important for stability?
21. Why do strands denature when heated?
22. What is the meant by the melting temperature Tm of DNA?
23. Will the Tm be higher or lower for a given DNA molecule in aqueous solution versus a 15% ethanol solution?

24. What is the difference between velocity sedimentation and equilibrium density gradient sedimentation?
25. How does ethidium bromide help to separate negatively supercoiled DNA from the nicked circular or linear forms of the same DNA?
26. What is the principle of Maxam-Gilbert chemical method of DNA sequencing?
27. What is the principle of Sanger's enzymatic or dideoxy method of sequencing?
28. What is the basis for hybridization between denatured strands (or single strands) of DNA?
29. How does DNA hybridization help to determine relatedness or differences between DNA molecules?
30. What is restriction length polymorphism (RFLP)?
31. How is RFLP useful in practical applications?