1. Compounds that contain a nitrogenous base, a pentose sugar, and a phosphate group are called (a)\_\_\_\_nucleotide\_\_\_. Two purines found in DNA are (b)\_\_adenine\_\_\_\_ and (c)\_\_guanine\_\_\_\_\_. In DNA, the base pair (d)\_\_G-C\_\_ is held together by three hydrogen bonds; the base pair (e) \_\_A\_ - \_T (U)\_\_has only two such bonds. In a solution of DNA, the purine and pyrimidine bases stack like coins because of their (f) hydrophobic\_\_\_\_ nature. When the solution containing DNA is heated, the optical absorbance (at 260nm) of the solution increases. This is because (g) \_hyperchromic effect.
2. Indicate whether the following statements about DNA are true or false.
3. A-form and B-form DNA are right-handed helices, but Z-form DNA is a left-handed helix found only in single-stranded DNA F
4. Palindromic sequences can potentially form cruciform structures. T
5. The dideoxy method of sequencing DNA can be used on B-DNA, but not on Z-DNA. F
6. Deoxyribose is bound to the pyrimidine base at C-1’ T
7. A pyrimidine in one strand of DNA always hydrogen bonds with a purine in the opposite strand. T
8. G-C pairs share three glycosidic bonds. F
9. All the monosaccharide units lack an –OH at C-2’ T
10. The phosphodiester bonds that link adjacent nucleotides join the 3’hydroxyl of one nucleotide to the 5’ hydroxyl of the next. T
11. The two stands are aligned as parallel strands. F
12. A-form DNA is shorter and has a larger diameter than the B-form DNA T
13. Nucleotide sequence has little or nor effect on which form DNA takes. F

1. Which of the following is true for DNA? D
2. phosphate groups project toward the middle of the double helix
3. deoxyribose units are connected by 3’,5’-phosphoanhydride bonds
4. the 5’ ends of the both strands are at the same end of the double helix
5. G-C pairs share three hydrogen bonds.
6. The ration of A+T to G+C is constant for all naturally occurring DNA
7. In the DNA sequencing by the Sanger (dideoxy) method: D
8. the template strand of DNA is radioactive.
9. Enzymes are used to cut the DNA into small pieces, which are then separated by electrophoresis.
10. ddTTP is added to each of four reaction mixtures prior to synthesis of complementary strands.
11. The role of ddATP is to occasionally terminate synthesis of DNA where dT occurs in the template strand
12. The sequence is read from the top of the gel downward.
13. The compound that consists of ribose linked by an N-b glycoside bond to N-9 of adenine is: C
14. a purine nucleotide
15. a pyrimidine nucleotide
16. adenosine
17. AMP
18. Deoxyadenosine.
19. The phosphodiester bonds that link adjacent nucleotides in DNA B
20. are positively charged
21. join the 3’ hydroxyl of one nucleotide to the 5’ phosphate group of the next
22. always link A with T and C with G
23. are positively charged and always link A with T and C with G
24. are positively charged and join the 3’ hydroxyl of one nucleotide to the 5’ hydroxyl of the next
25. Nucleic acid samples have been isolated from three different organisms. The nucleic acids have the following base ratios (%):

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | A | T | U | G | C | A+T/G+C | A+G/C+T |
| Sample 1 | 20 | 19 | 0 | 29 | 30 | 0.66 | 1 |
| Sample 2 | 247 | 0 | 16 | 24 | 36 | 0.4 | 1.3 |
| Sample 3 | 17 | 17 | 0 | 33 | 33 | 0.5 | 1 |

Which sample(s) are DNA? Which sample would you expect to have the highest *Tm* (melting point)? A

1. 1 and 3; 3
2. 1, 2 and 3; 3
3. 1; 2
4. 1 and 3; 1
5. 2 and 3; 2

8. Two molecules of double-stranded DNA are the same length (1,000 base pairs), but differ in base composition. Molecule 1 contains 20% A+T; molecule 2 contains 60% A+T. which molecule has a higher tm? How many C residues are there in the 60% A+T DNA molecule? D

A. 2; 40

B. 1; 200

C. 2; 400

D. 1; 400

E. 2; 200

11. What crucial pieces of information from the Hershey-Chase experiment indicated that DNA is the genetic material?

Only bacteria, infected by phages which are labeled by 32P, is radioactive after blender treatment. This key information indicated only phage DNA can be injected into bacteria to build new phages. Thus, we can speculate that DNA is the genetic material.

12. Which of “Chargaff’s rules” was the most important clue leading to the model postulated by Watson and Crick? Why?

DNA molecules always contain A+G equal to C+G. And, the number of A is equal to T, whereas number of G is equal to C.

13. why does DNA contain thymine rather than uracil?

Thymine can also be thought of as 5-methyl-uracil. Deamination causes the transformation of cytosine to uracil. In DNA, enzymes can distinguish T and U, and U indicates the damage of DNA. Thus, enzymes recognize U residue and then repair it. If replace T to U on DNA, the enzymes cannot distinguish normal U and unnormal U so that they will fail to repair damage on DNA.