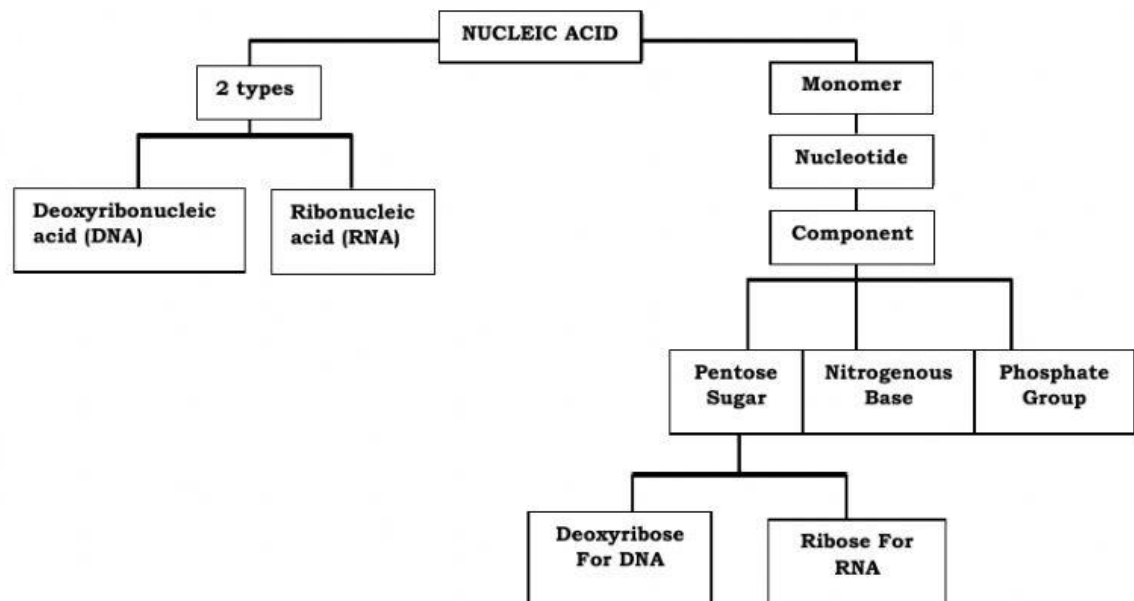


1.5 DNA AND RNA MOLECULES

Learning outcome

At the end of the lessons, students should be able to:

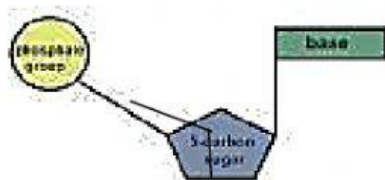
- State the structure of nucleotide as the basic composition of nucleic acids (deoxyribonucleic acid, DNA and ribonucleic acid, RNA).
- Differentiate between RNA and DNA nucleotide.
- Describe the structure of DNA based on the Watson and Crick Model.



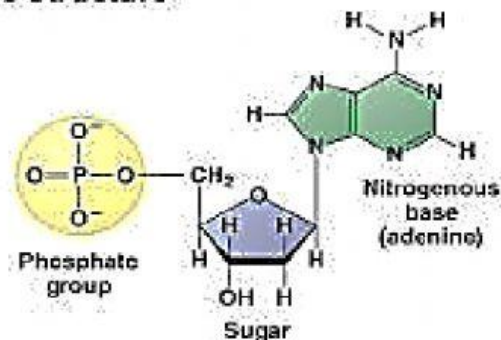
a) State the structure of nucleotide as the basic composition of nucleic acids (deoxyribonucleic acid, DNA and ribonucleic acid, RNA).

- There are two types of nucleic acid: _____ (DNA) and _____ (RNA).

Basic Nucleotide Structure



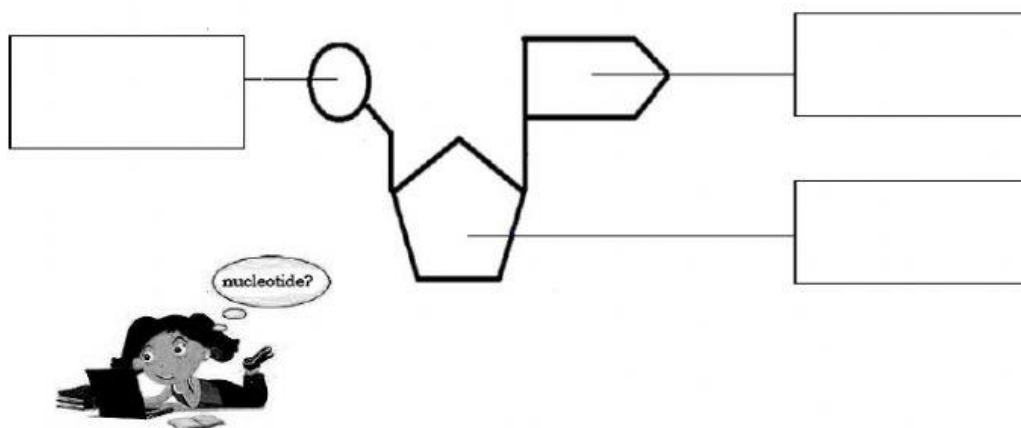
General Structure



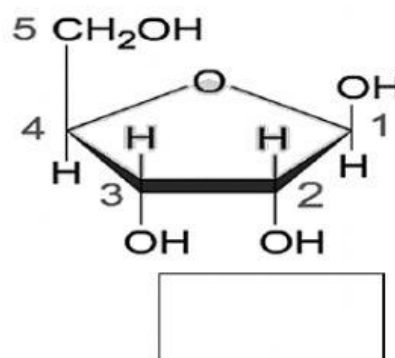
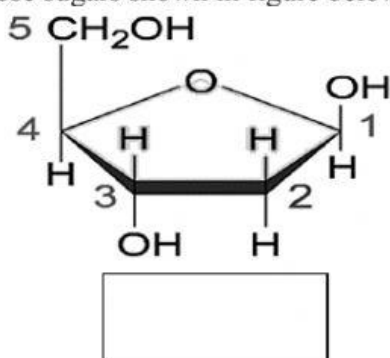
Structure of Adenine

- Monomer for nucleic acid is _____.
- It is made of three components: _____ sugar, _____ base and _____ group.
- In a nucleotide, _____ is attached to the carbon number one of pentose sugar while _____ is joined to the carbon number five of pentose sugar.
- Pentose sugar of DNA is known as _____ sugar while for RNA known as _____ sugar.
- There are two types of nitrogenous base which are _____ and _____.
- Purine consist of Adenine and _____ base
- Pyrimidine consist of Cytosine, _____ and Uracil.

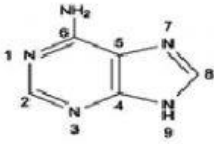
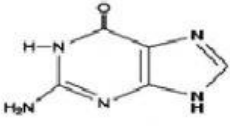
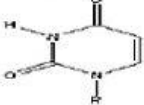
Exercise 1.5 (a): Identify each component of the nucleotide below.



Exercise 1.5 (b): Name and circle the difference between the two different types of pentose sugars shown in figure below.



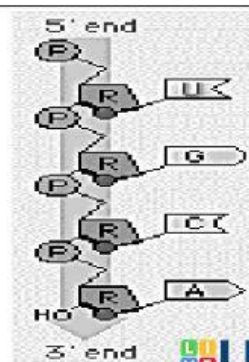
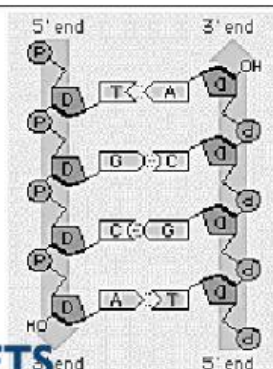
Types of nitrogenous base:

_____ ???	_____ ???
• _____ rings  Adenine  Guanine	• _____ ring  Thymine  Cytosine  Uracil

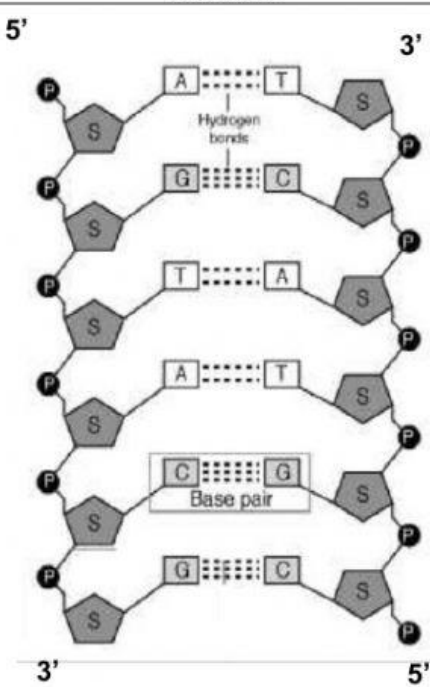
b) Differentiate between RNA and DNA nucleotide.

Exercise 1.5 (c): List all the differences between DNA dan RNA.

DNA	RNA



c) Describe the structure of DNA based on the Watson and Crick Model.

Structure	Characteristics (Features)
 The diagram illustrates the double helix structure of DNA. Two strands are shown, one on the left and one on the right. The left strand is oriented 5' at the top and 3' at the bottom. The right strand is oriented 3' at the top and 5' at the bottom. Each strand consists of a backbone of alternating phosphate groups (P) and sugar molecules (S). Nitrogenous bases (A, T, G, C) are attached to the sugar molecules. The bases on opposite strands are paired: Adenine (A) pairs with Thymine (T), and Guanine (G) pairs with Cytosine (C). Hydrogen bonds, represented by dotted lines, connect the base pairs. A specific pair of C and G is highlighted and labeled 'Base pair'.	• Consist of _____ polynucleotide strands • The 2 strands are _____ and coiled in a spiral forming _____ structure. • The pentose sugar in its nucleotide is _____ sugar. • The nucleotides in each strands are joined by _____ bond (between its phosphate group of one nucleotide and carbon number five of pentose sugar of another nucleotide), _____ forming _____ backbone. • The two strands are anti-parallel and must be complementary to each other. • Involve pairing of four organic bases: _____, Guanine (G), Thymine (T), _____. • The organic bases are paired and linked by _____ bond. • Adenine must pair with _____ with _____ hydrogen bonds. • Guanine must pair with _____ with _____ hydrogen bonds. • Chargaff's rules (base pairing rules): i. Pairing of bases must be between purine and _____ ii. The ratio of (G+C) to (A+T) is different for each species.

Functions of nucleic acids:

1. Storage of genetic information (DNA)
2. Transmit genetic information from generation to generation (DNA)
3. Self-replication (DNA)
4. Transmit genetic information for cell use (RNA)