



CHEMISTRY ONLINE
— **TUITION** —

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BIOLOGY

BIOLOGICAL MOLECULES

LEVEL & BOARD:	AQA (A - LEVEL)
TOPIC:	Nucleic Acids
PAPER TYPE:	Solution 1
TOTAL QUESTIONS:	06
TOTAL MARKS:	28

Nucleic Acids

1.

(a) DNA is made up of two strands of nucleotides. The nucleotides are made up of a sugar (deoxyribose in DNA), a phosphate, and a nitrogen base. The sugars and phosphates make up the "handrails" (or "backbone"), and are held together by covalent bonds. Each molecule of DNA is a double helix formed from two complementary strands of nucleotides held together by hydrogen bonds between G-C and A-T base pairs.

2.

(a) A phosphodiester bond occurs between nucleotides, monomers that build nucleic acid, to form the sugar-phosphate backbone. Phosphodiester bond formation occurs by the removal of a water molecule when 2 hydroxyl groups from 2 different sugars bond with a phosphate group, thus it is known as a condensation reaction.

(b) 70

(c) Histone

(d) Initiator protein unwinds a short stretch of the DNA double helix. Then, a protein known as helicase attaches to and breaks apart the hydrogen bonds between the bases on the DNA strands, thereby pulling apart the two strands.

3.

(a) DNA polymerase joins nucleotides on new strand. Hydrogen bonds reform. This process is called Semi-conservative replication because the new DNA molecules contain one old strand and one new strand.

DNA polymerase catalyzes condensation reactions.

It catalyzes the formation of phosphodiester bonds between adjacent nucleotides.

4.

(a) Watson and Crick

(b) DNA polymerase

(c) Role of single-stranded DNA fragments

- They act as template strands.
- They Determine order of nucleotides bases.

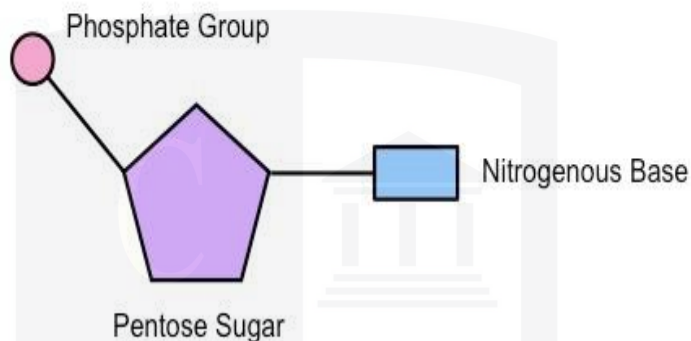
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Role of DNA nucleotides

- It forms complementary pairs e.g. A-T, G-C
- It forms complementary DNA strand.

4.

(a)



(b)

- The hydrogen bonds between the two chains of polynucleotides are weak so can easily be broken to separate the strands.
- The complimentary bases (A,T,C,G) can also form a template for DNA replication.
- Two strands, so both can act as templates.

(c) c 550 seconds

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5.

(a)

- DNA helicase causes breaking of hydrogen bonds between DNA strands.
- DNA polymerase joins the nucleotides
- Forming phosphodiester bonds

(b)

- Treatment D antibody binds to cyclin A so it cannot bind to initiate DNA replication.
- Treatment E RNA interferes with mRNA formation so cyclin A not made.
- In Treatment F added cyclin A can bind to initiate DNA replication.

6.

(a) 8

(b) Phosphodiester bond

(c)

- DNA helicase causes breaking of hydrogen bonds between DNA strands.
- DNA polymerase catalyzes the formation of DNA by moving along the strand, joining the nucleotides together by phosphodiester bonds.

(d)

- ATP has ribose and DNA nucleotide has deoxyribose.
- ATP has 3 phosphate groups and DNA nucleotide has 1 phosphate group.
- ATP base always adenine and in DNA nucleotide base can be different.

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