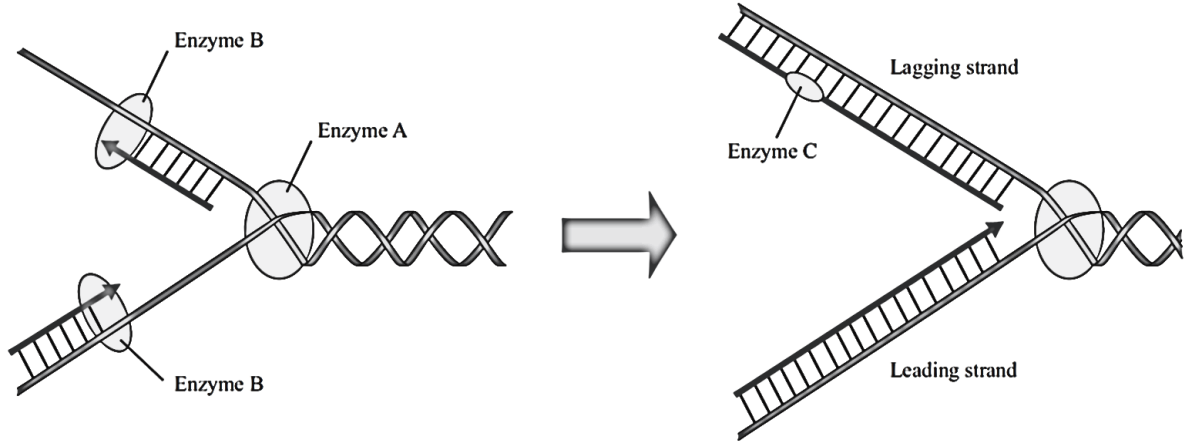


**AS 90715 Describe the role of DNA in relation to gene expression**

**DNA Replication**

**(2011:1)**

The diagram below shows a simplified representation of the process of DNA replication. A, B and C are enzymes involved in the process.



- (a) Explain the purpose of DNA replication.
- (b) Discuss the role of enzyme action in the process of DNA replication.

In your answer you should:

- identify the enzymes shown in the diagram
- explain the role of each enzyme
- discuss the specific consequences if any of these enzymes should fail to function correctly.

**(2010:1b)**

When DNA is replicated, each of the parent strands acts as a template.

Explain why there is a difference in the way in which the parallel strands of DNA are replicated.

You may use a labelled diagram to support your answer.

**(2009:1)**

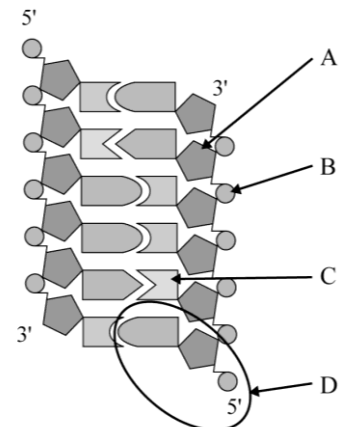
The NF1 gene contains 8 454 base pairs and codes for a protein called neurofibromin. Neurofibromin regulates the action of the Ras protein, which **promotes cell division**. Mutant forms of NF1 produce a protein that cannot regulate Ras properly.

- (a) When DNA is replicated, it is important that cells make exact copies of genes such as NF1.  
Explain why replication of a gene needs to be exact, with reference to the role of the NF1 gene.

**(2007:1)**

The following diagram shows part of a DNA molecule.

- (a) Identify the structures labeled A, B, C and D in the diagram, by writing their names.
- (b) DNA is able to make copies of itself. This process is controlled by several enzymes.  
Describe the role of each of the following enzymes in DNA replication:
  - (i) DNA polymerase
  - (ii) DNA helicase
  - (iii) DNA ligase

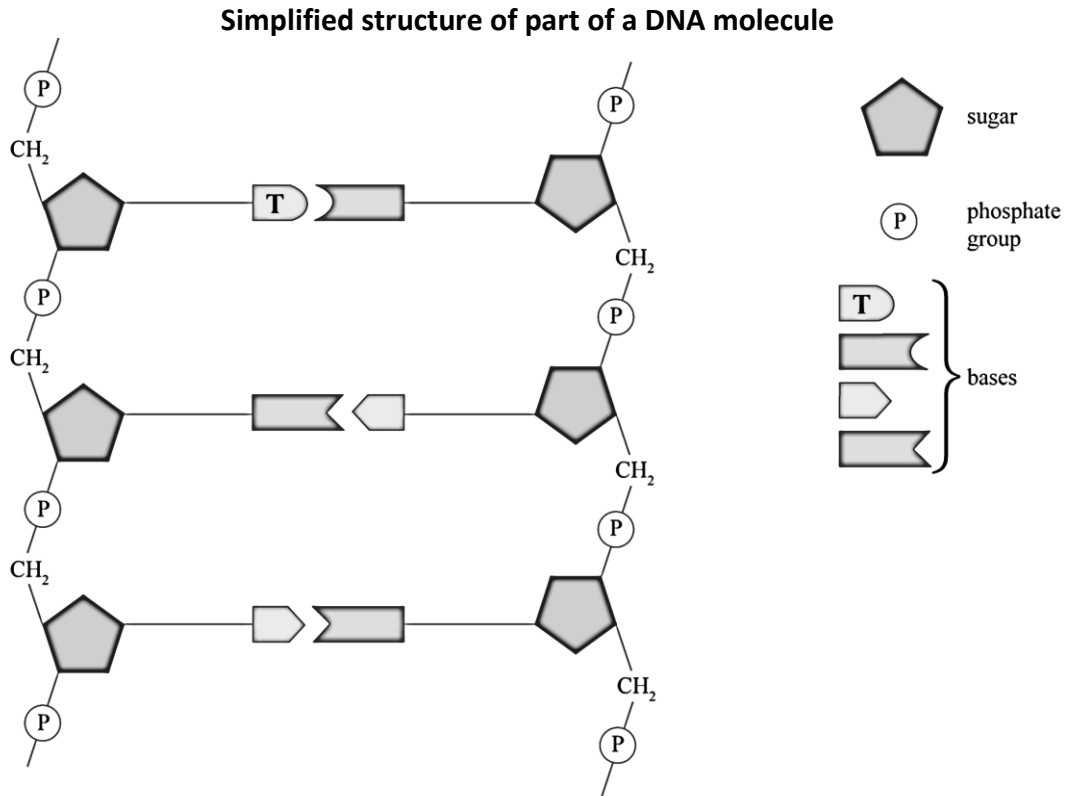


(2006:1)

DNA is a polymer, made up of a large number of sub-units (nucleotides).

(a) The unlabeled diagram below shows the basic structure of a DNA molecule. Complete the diagram by giving information that clearly identifies:

- the four bases and their positions (one base has been identified in the diagram)
- the number of hydrogen bonds between bases
- the anti-parallel nature of the molecule
- which end of the DNA strand new nucleotides are added to.



(b) Explain why DNA replication is necessary.

(c) Discuss how DNA replicates. In your discussion, you should explain:

- how replication begins
- the roles of the main enzymes involved
- leading and lagging strands
- Okazaki fragments
- the source of materials for replication.