# 7.1 DNA Structure & Replication

## Question Paper

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|---|---|
| Course | DP IB Biology |
| Section | 7. Nucleic Acids (HL Only) |
| Topic | 7.1 DNA Structure & Replication |
| Difficulty | Easy |

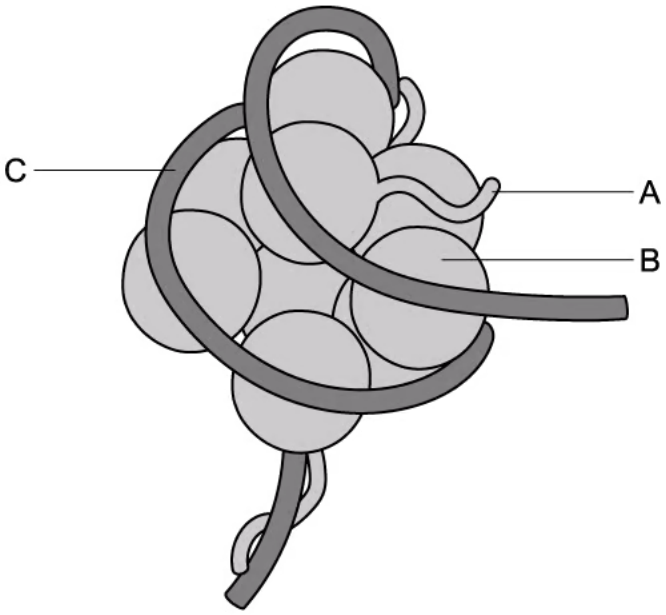
**Time allowed:** 50

**Score:** /41

**Percentage:** /100

## Question 1a

a)
The diagram below represents a nucleosome.




Label parts **A** to **C** on the diagram.

**[3 marks]**

**[3 marks]**

## Question 1b

b)
Prokaryotic DNA does not form nucleosomes.

State the reason for this.

**[1 mark]**

**[1 mark]**

## Question 1c

c)
In eukaryotes, a great length of DNA is packed into a very small nucleus.

Describe how a nucleosome would contribute to make this possible.

**[2 marks]**

**[2 marks]**

## Question 1d

d)
Rosalind Franklin and Maurice Wilkins used a specific technique to study the structure of DNA.

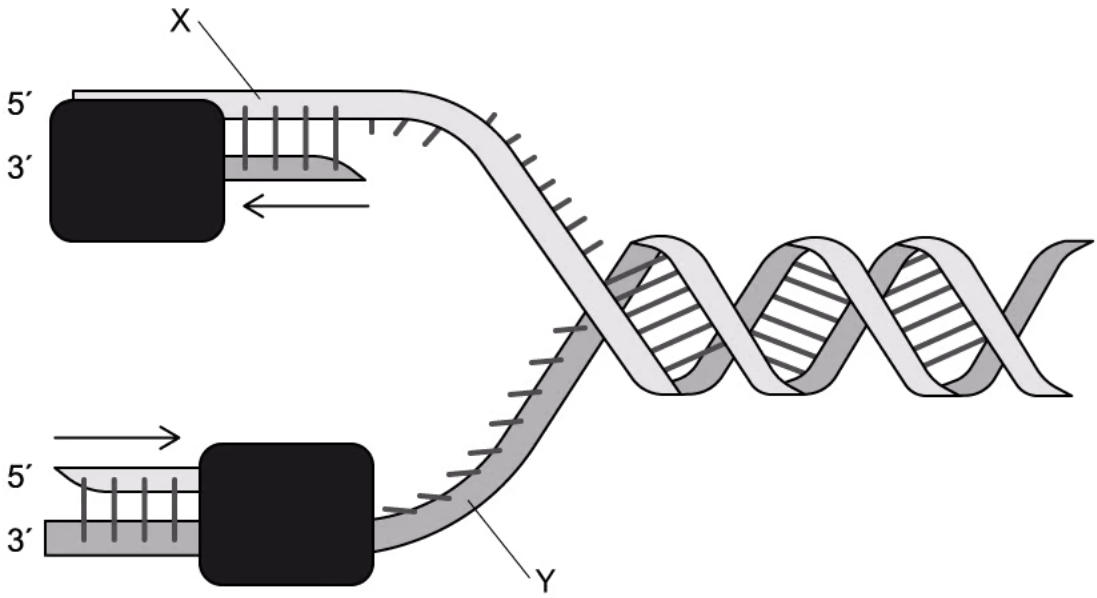
State the name of this technique.

**[1 mark]**

**[1 mark]**

## Question 2a

a)
The diagram below shows the process of DNA replication.




Identify template strand **X** and **Y** of the original DNA molecule.

**[2 marks]**

**[2 marks]**

## Question 2b

b)
DNA replicates in a semi-conservative way.

Define the term 'semi-conservative' with regards to DNA replication.

**[1 mark]**

**[1 mark]**

## Question 2c

c)
One of the enzymes involved with DNA replication is DNA primase.

Describe the role of DNA primase during DNA replication.

**[2 marks]**

**[2 marks]**

## Question 2d

d)
DNA replication can only occur in the 5' to 3' direction in the new strand.

State the reason for this.

**[1 mark]**

**[1 mark]**

## Question 3a

a)
A crime was committed and the DNA profiles of the victim and a drop of blood found at the crime scene were constructed. These were compared to the DNA profiles of three possible suspects, as seen in the diagram below.


Identify the suspect that most likely committed the crime.

**[1 mark]**

**[1 mark]**

## Question 3b

b)
Variable number tandem repeats (VNTRs) are short, non-coding regions of DNA that can be used in DNA profiling.

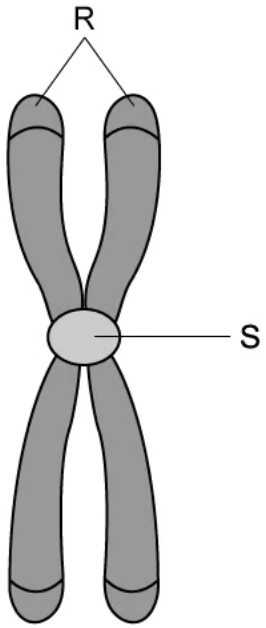
Explain the use of VNTRs in DNA profiling.

**[2 marks]**

**[2 marks]**

## Question 3c

c)
The diagram below represents the structure of a chromosome.




Label parts **R** and **S** of the chromosome.

**[2 marks]**

**[2 marks]**

## Question 3d

d)
**R** and **S** from the chromosome at part c) represents non-coding regions of DNA.

State the function of **R** and **S** in a chromosome.

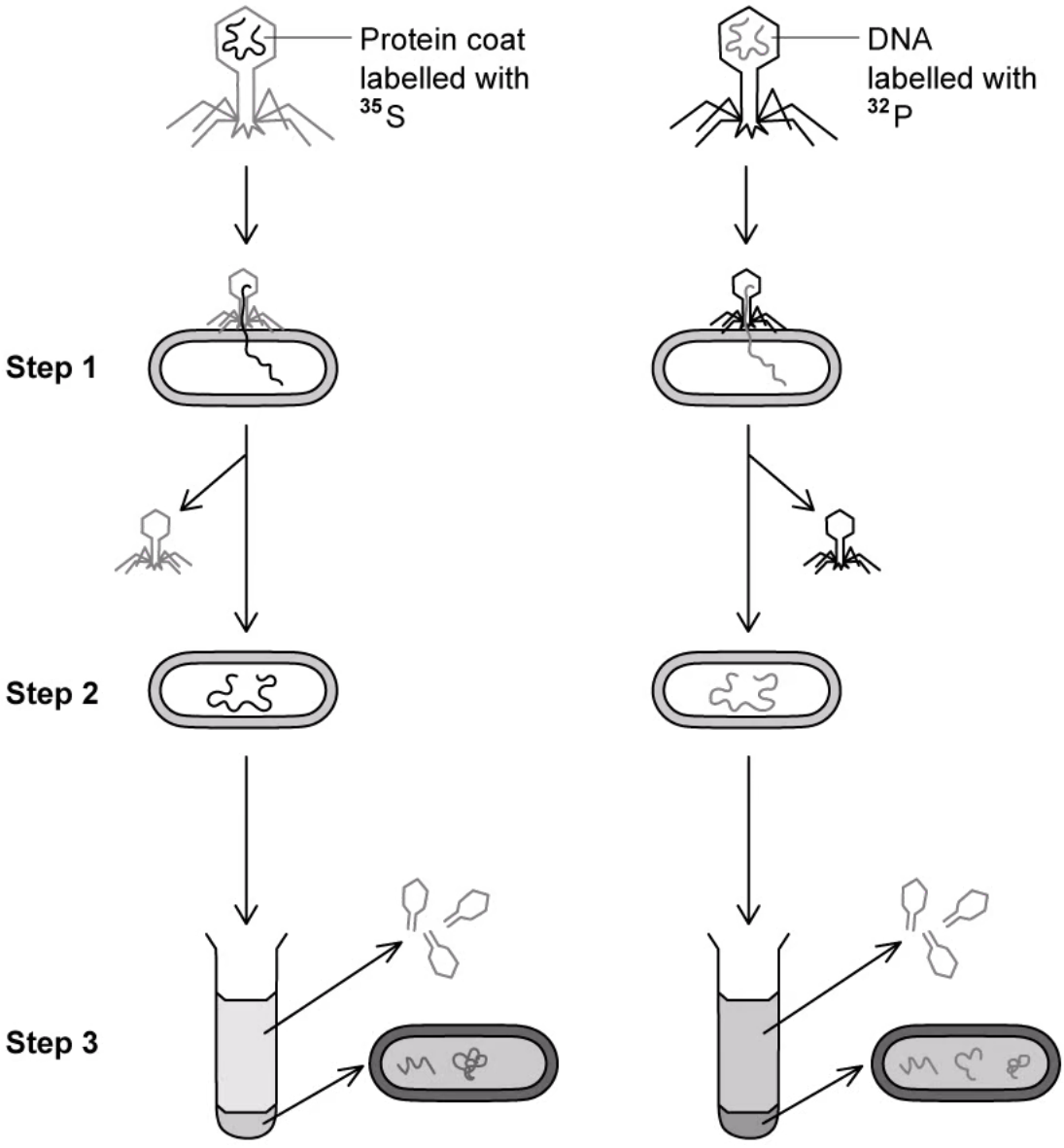
**[2 marks]**

**[2 marks]**

## Question 4a

a)

The diagram below shows the experimental procedure followed by Alfred Hershey and Martha Chase.




State the aim of this experiment.

**[1 mark]**

**[1 mark]**

## Question 4b

b)
Based on the information in the diagram at part a), state **one** reason why viruses were used in this experiment.

**[1 mark]**

**[1 mark]**

## Question 4c

c)
Describe the events taking place between step **1** and **2** of the experiment.

**[2 marks]**

**[2 marks]**

## Question 4d

d)
State the results obtained at the end of step **3**.

**[2 marks]**

**[2 marks]**

## Question 5a

*One mark is available for clarity of communication throughout this question.*

a)
Describe the roles of non-coding regions of DNA molecules.

**[4 marks]**

**[4 marks]**

## Question 5b

b)
The chain-termination method is one way in which DNA can be sequenced.

Outline the steps of the chain termination method of DNA sequencing.

**[6 marks]**

**[6 marks]**

## Question 5c

c)
Molecular visualisation software is a useful tool with which to study the structure of molecules.

State **five** applications of molecular visualisation software in the fields of medicine and science.

**[5 marks]**

**[5 marks]**