

6.1 Structure of Nucleic Acids & Replication of DNA

Question Paper

Course	CIE A Level Biology (9700) exams from 2022
Section	6. Nucleic Acids & Protein Synthesis
Topic	6.1 Structure of Nucleic Acids & Replication of DNA
Difficulty	Medium

Time allowed:

10

Score:

/10

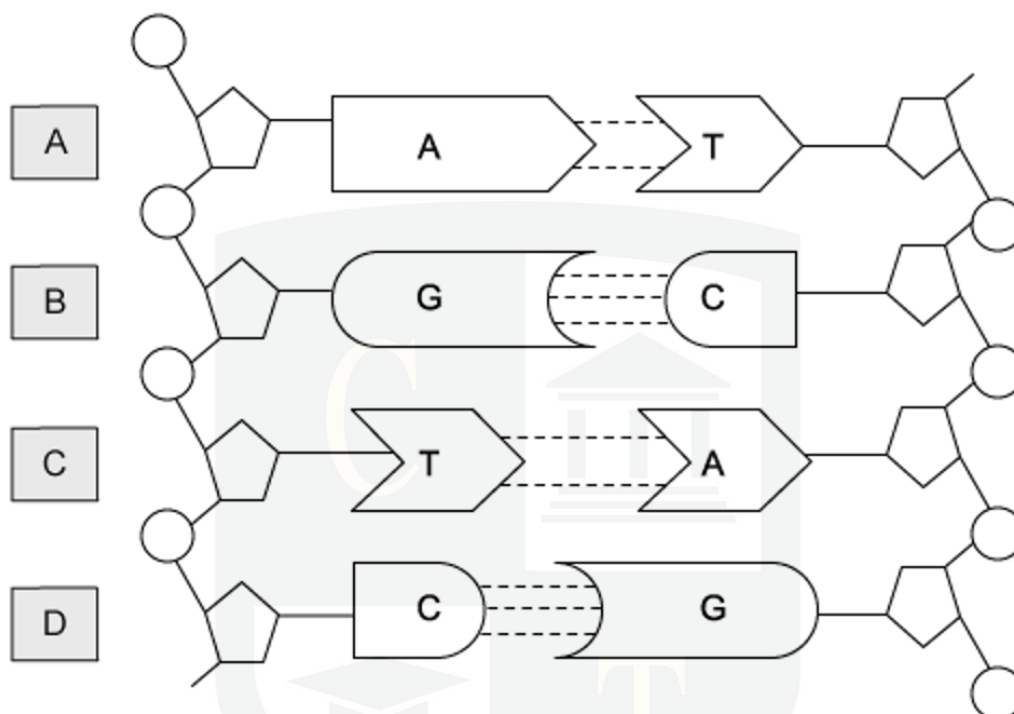
Percentage:

/100

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Question 1

Which base pair has the mistake?



[1 mark]

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Question 2

A short piece of DNA 19 base pairs long was analysed to find the number of nucleotide bases in each of the polynucleotide strands. Some of the results are shown below

	number of nucleotide bases			
	A	T	G	C
strand 1	8	-	-	-
strand 2	-	8	3	4

How many nucleotides containing adenine (A) were present in strand 2?

- A** 2
- B** 4
- C** 6
- D** 8

[1 mark]

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Question 3

During semi-conservative replication of DNA, the following processes occur:

- 1 Free nucleotides are hydrogen bonded to those on the exposed strand.
- 2 The cell receives the signal to begin to divide.
- 3 Hydrogen bonds are broken between the complementary base pairs.
- 4 Covalent bonds form between adjacent nucleotides on the same strand.
- 5 The DNA double helix is unwound.

Which is the correct order of the processes?

- A** 2 → 5 → 3 → 4 → 1
- B** 2 → 5 → 3 → 1 → 4
- C** 2 → 1 → 4 → 3 → 5
- D** 2 → 1 → 5 → 4 → 3

[1 mark]

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Question 4

The table shows the percentages of bases in DNA from various types of cell.

source of DNA	adenine	cytosine	guanine	thymine
human hair	30	20	21	Z
human liver	W	40	40	11
dog liver	24	26	24	26
mouse bone marrow	23	X	27	25
sunflower leaf	11	41	Y	10

What is a valid deduction from this data?

- A** W = 9 X = 24 Y = 38 Z = 29
- B** W = 9 X = 26 Y = 37 Z = 31
- C** W = 9 X = 25 Y = 38 Z = 29
- D** W = 10 X = 25 Y = 37 Z = 30

[1 mark]

Question 5

Which of the following would be a result of analysing a DNA molecule?

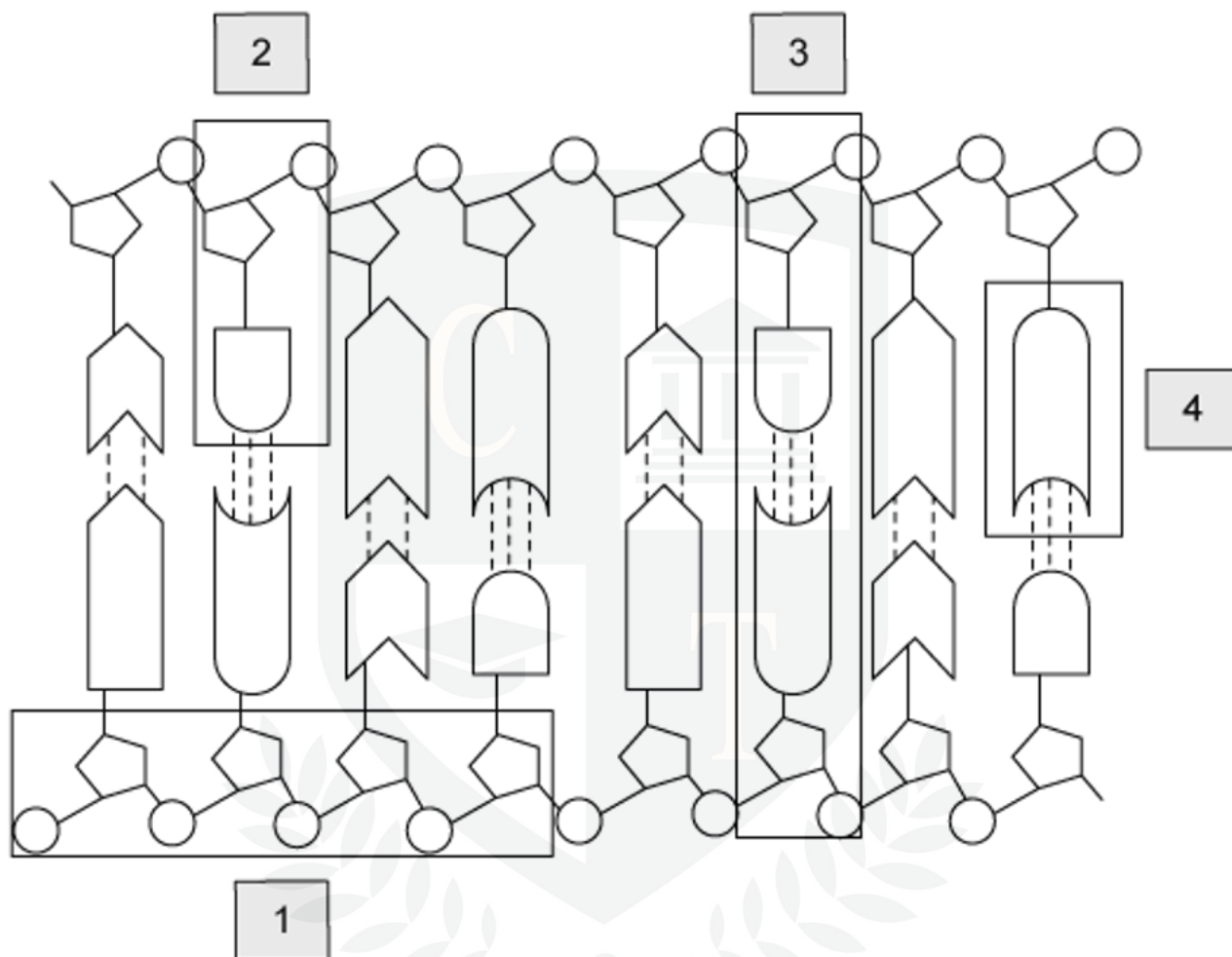
- A** An equal ratio of pentose sugars to phosphates and an equal ratio of thymine to adenine bases.
- B** Twice as many pentose sugars as phosphates and an equal ratio of guanine to cytosine bases.
- C** An equal ratio of hexose sugars to phosphates and an equal ratio of thymine to cytosine bases.
- D** Twice as many hexose sugars as phosphates and an equal ratio of guanine to adenine bases.

[1 mark]



Question 6

The diagram shows part of a DNA molecule



Which row correctly describes the highlighted sections of DNA?

	contains a base	hydrogen bonding present
A	2, 3 and 4	1 only
B	2, 3 and 4	3 only
C	1, 2, 3 and 4	3 and 4 only
D	1, 2, and 4	3 only

[1 mark]

Question 7

In 1957, Meselson and Stahl conducted an experiment that provided overwhelming evidence to support the theory that DNA replication was semi-conservative. They used *E. coli* which has a generation time of around one hour.

Here are the steps in their experiment in a mixed-up order

- 1 Bacteria contain either all ^{14}N DNA or hybrid DNA
- 2 Bacteria grown in a ^{15}N medium for many generations
- 3 Bacteria transferred to a ^{14}N medium and sampled every hour
- 4 All bacteria contain hybrid DNA (^{14}N DNA and ^{15}N DNA).
- 5 All bacteria contain ^{15}N DNA

Which is the correct order of the processes?

- A $4 \rightarrow 3 \rightarrow 1 \rightarrow 2 \rightarrow 5$
- B $3 \rightarrow 1 \rightarrow 2 \rightarrow 4 \rightarrow 5$
- C $5 \rightarrow 4 \rightarrow 3 \rightarrow 1 \rightarrow 2$
- D $2 \rightarrow 5 \rightarrow 3 \rightarrow 4 \rightarrow 1$

[1 mark]

Question 8

The diagram shows part of an RNA molecule.



Which row of the table below is correct?

	uracil	phosphate	ribose	guanine
A	W	Z	Y	X
B	W	Y	Z	X
C	X	Z	Y	W
D	X	Y	Z	W

[1 mark]

Question 9

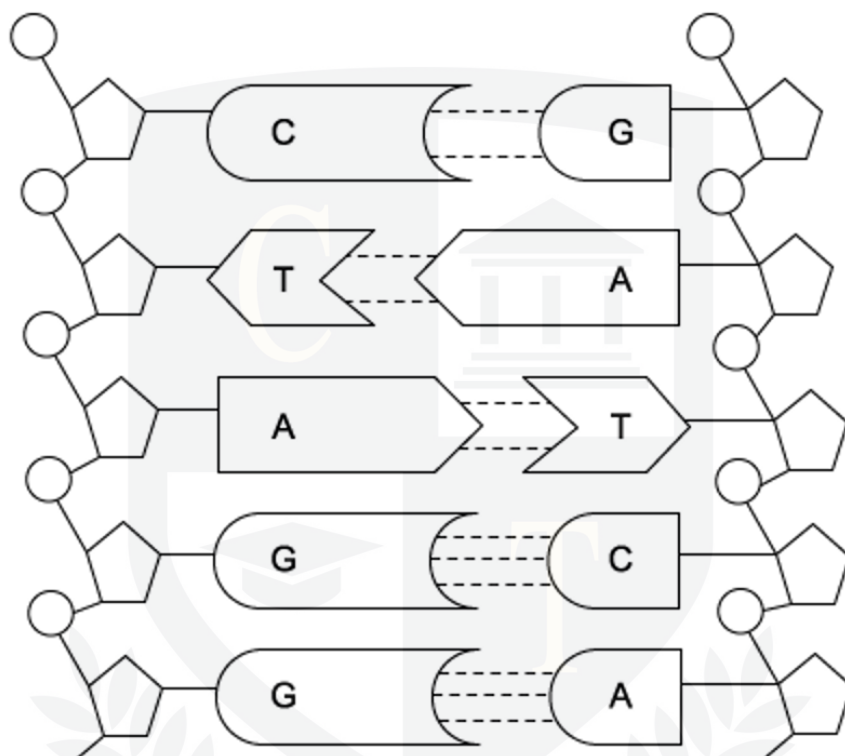
Which nucleic acid bases are pyrimidines?

- A** adenine and guanine
- B** thymine and adenine
- C** thymine and guanine
- D** cytosine and uracil

[1 mark]

Question 10

How many mistakes are there in this DNA sequence?



- A 1
- B 2
- C 3
- D 4

[1 mark]