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Level: HL IB in Biology

Subject: Biology

Topic: IB HL Biology

Type: Topic Question

2002



1583

All International Baccalaureate IB Topic Questions HL Biology

BIOLOGY

HL - IB

Key skills

****Question 1****

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]

****Question 2****

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 3****

DNA is described as a double-helix, antiparallel structure. Which of the following statements best explains the term,

'antiparallel'?

- A. One strand possesses deoxyribose sugar, the opposite strand possesses ribose sugars.
- B. The nitrogenous bases invert their orientation on the sense strand versus the antisense strand.
- C. The alignment of the sugar-phosphate backbone of each strand runs in opposite directions.
- D. The alignment of the two strands of nucleotides runs in opposite directions.

[1 mark]

****Question 4****

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The approximate angle of orientation ('twist') of one nucleotide in respect to its neighbouring nucleotide in a given strand

of DNA is between 35 and 40 degrees. How many base pairs are required for the double-helix to twist by one whole turn?

- A. 5
- B. 8
- C. 10
- D. 12

[1 mark]

****Question 5****

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 6****

The table shows the percentages of bases in DNA samples from various organisms.

Source of DNA	Adenine	Cytosine	Guanine	Thymine
Human liver	30	20	20	Z
Chicken liver	W	40	40	10
Dog liver	24	26	24	26
Mouse bone marrow	23	X	26	25
Sunflower leaf	10	39	Y	12

Which row of the table below correctly reflects the missing data values?

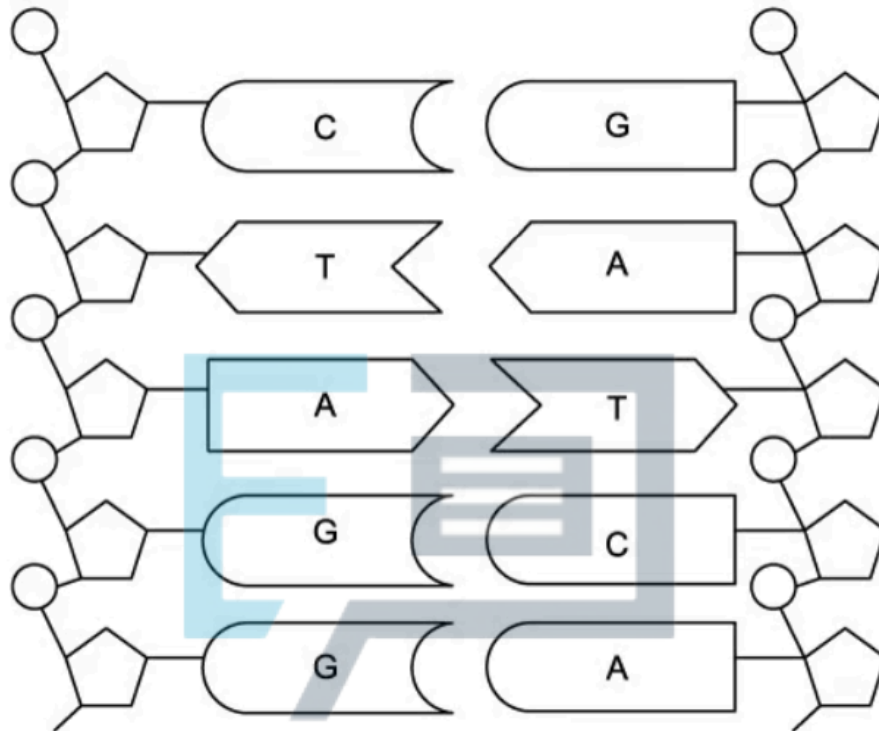
	W		X		Y	Z
A	9		24		38	30
B	10		26		39	31
C	10		26		39	30
D	10		25		38	29

[1 mark]



****Question 7****

The simplified diagram represents a section of DNA in 2D form.



How many mistakes are there in this diagram?

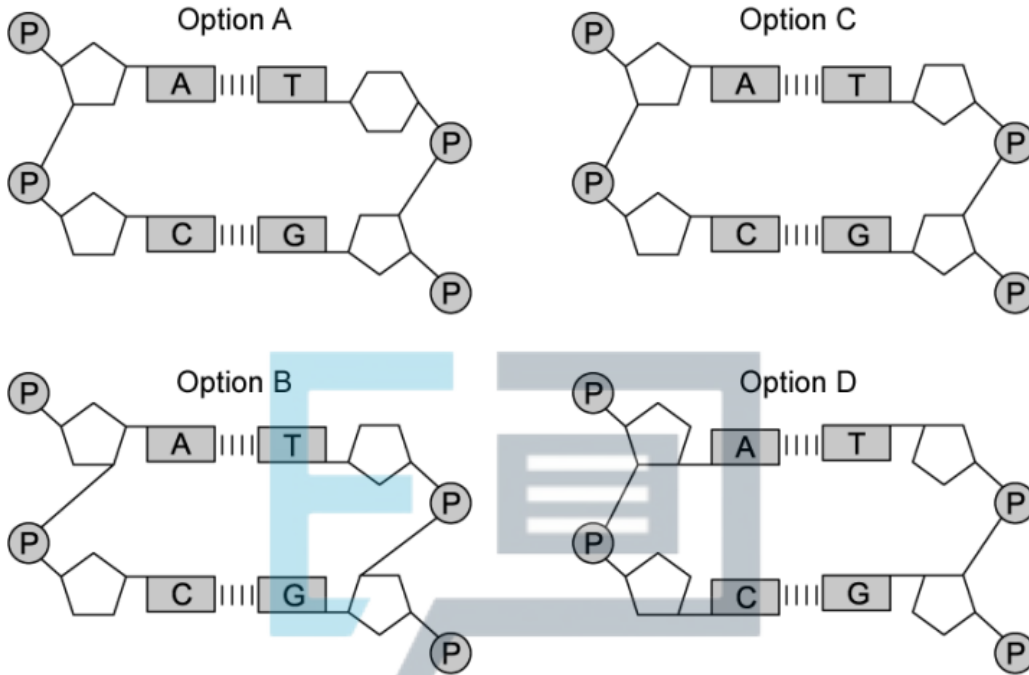
- A. 0
- B. 1
- C. 3
- D. 5

[1 mark]



****Question 8****

Which of the following drawings best represents the structure of a section of DNA?



[1 mark]

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****Question 9****

Which of the following statements about the genetic code are correct?.

- I. A single DNA base will always be transcribed and translated in eukaryotic organisms.
- II. A single DNA base can be part of genes that overlap each other.
- III. The genetic code allows multiple triplet codons to code for a single amino acid.
- IV. The genetic code in a eukaryotic organism's genome stays the same throughout the organism's life.

- A. III only
- B. I and IV
- C. I, II and III
- D. III and IV

[1 mark]

****Question 10****

Which of the following are correct statements about nucleosomes?

- I. They contain histone proteins
- II. They help supercoil the DNA to form a compact structure
- III. They are found in both eukaryotes and prokaryotes
- IV. They consist of both DNA and chromatin

- A. I only
- B. I and II
- C. I, II and III
- D. I, II and IV

[1 mark]

****Question 11****

In the 1950s, Hershey and Chase demonstrated that DNA, not protein, is a factor of heredity responsible for carrying genetic information from one generation to another. They used viruses that were labelled with either radioactive sulphur (^{35}S) or radioactive phosphorus (^{32}P) to infect bacteria.

Which of these statements correctly describes the results of their experiment?

- A. Only bacteria infected by ^{32}P labelled viruses were shown to be radioactive
- B. ^{32}P was only detected in the supernatant
- C. Only bacteria infected by ^{35}S labelled viruses were shown to be radioactive
- D. ^{35}S was detected in the pellet after centrifugation

[1 mark]

****Question 12****

Molecular visualisation software can be used to look at the three-dimensional structure of complex macromolecules such as the nucleosome.

Which of the following statements about molecular visualisation software are correct?

- I. Can help relate structure to chemical or biological behavior.
- II. Can support the design of pharmaceutically active compounds.
- III. Can be used to study the interactions between proteins.
- IV. Is primarily used to identify if a DNA sequence encodes for a gene.

A. I and II

B. I, II and III

C. I and IV

D. I, II, III and IV



[1 mark]

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