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Level: SL IB in Biology
Subject: Biology
Topic: IB SL Biology
Type: Topic Question

2002



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All International Baccalaureate IB Topic Questions SL Biology

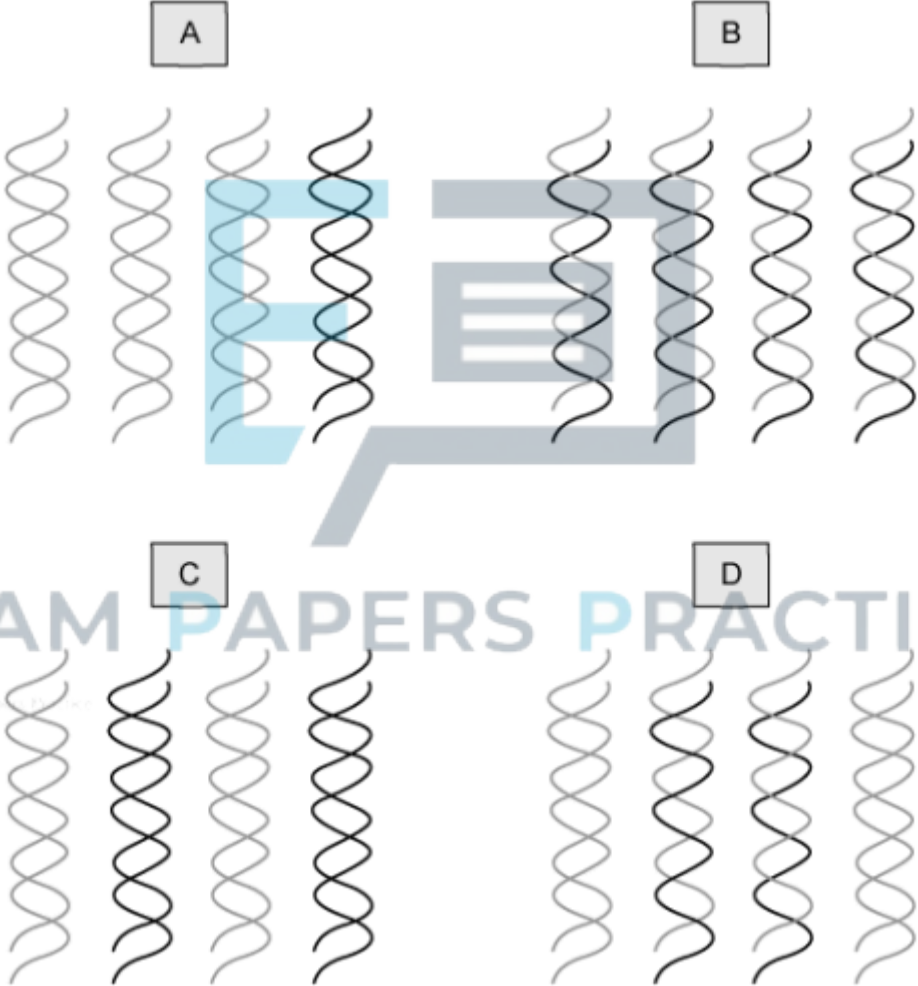
BIOLOGY

SL - IB

Key skills

Question 1.

Which of the following shows the appearance of the DNA strands that would result after two rounds of DNA replication? Note that the black strands represent DNA present in the original DNA molecule. The grey strands represent newly synthesized DNA.



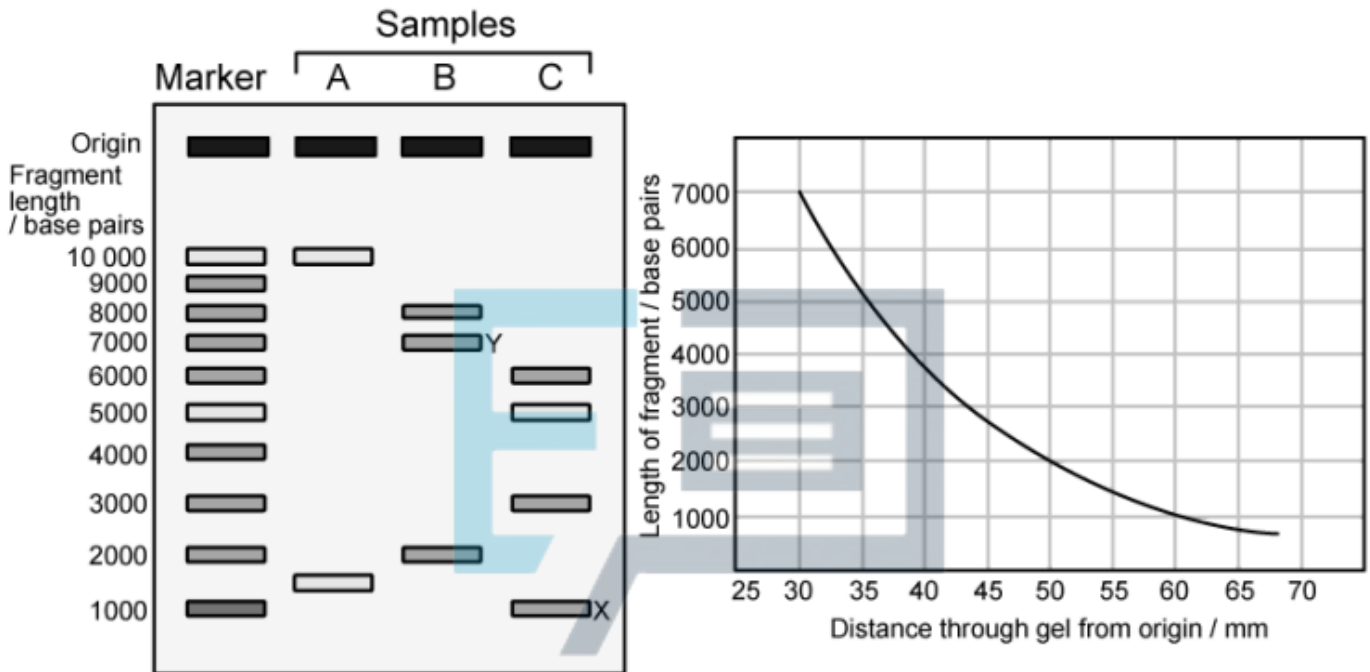
The diagrams show four possible outcomes of two rounds of DNA replication from a single original molecule (two black strands):

- A:** Two DNA molecules with one black and one grey strand, and two DNA molecules with two grey strands.
- B:** Two DNA molecules with one black and one grey strand, and two DNA molecules with two grey strands.
- C:** Two DNA molecules with one black and one grey strand, and two DNA molecules with two grey strands.
- D:** Two DNA molecules with one black and one grey strand, and two DNA molecules with two grey strands.

[1 mark]

Question 2,

A DNA profile was created for two genes in three individuals (A,B, and C).



Which of the following statements, relating to the images provided, are correct?

- I. The relationship between DNA fragment length and distance moved through the gel is linear.
- II. Fragment Length is determined by the number of repeated DNA sequences in a sample. .
- III. There is a percentage increase of 50 % between the distance moved by fragment Y and that moved by fragment X.
- IV. Individual A is homozygous for both of the genes tested.

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

[1 mark]

Question 3.

Some scientists were investigating the allele frequencies in a population of flies for a gene responsible for insecticide resistance.

They obtained DNA samples from a representative group in the population and then carried out PCR to amplify the DNA.

Scientists used the same restriction endonuclease on each sample before undertaking PCR, explain why.

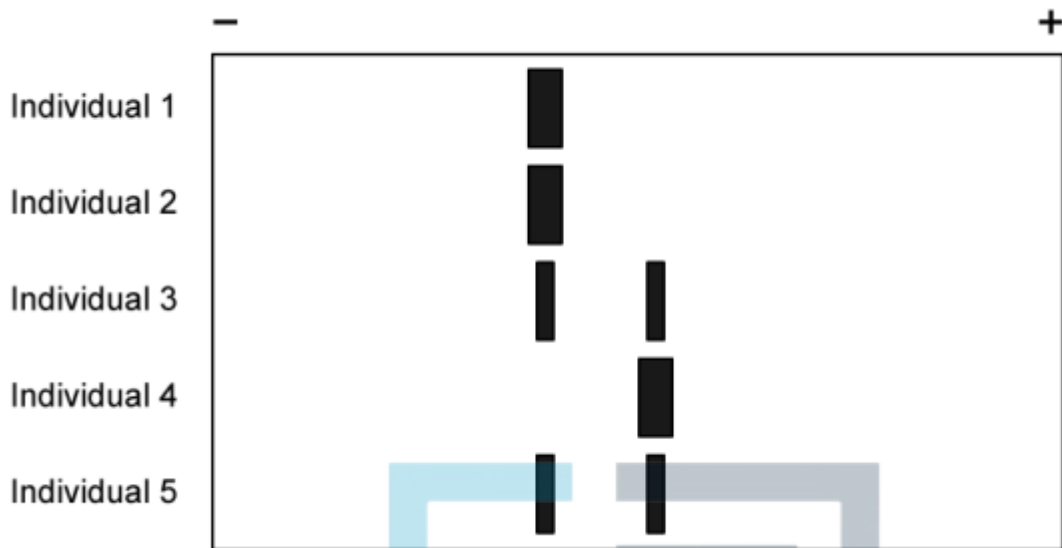
- A. To separate the DNA template strands
- B. To isolate the required gene sequence
- C. To produce smaller DNA fragments
- D. To allow RNA polymerase to bind to the promoter region

[1 mark]

Question 4.

DNA samples were taken from five individuals and analysed using gel electrophoresis to produce a DNA profile. The DNA profile shows the results for a single gene.

What conclusions can be made from the profile shown in the image?



- A. There are equal frequencies of two alleles
- B. There are 3 different alleles for the gene
- C. There are two alleles and the frequency of one allele is about 75%.
- D. There are three homozygous individuals in the population

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[1 mark]

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Question 5.

Which of the following statements accurately describes the significance of the leading and lagging strands during DNA replication?

- A. Both the leading and lagging strands are synthesized continuously.
- B. The leading strand is synthesized in the 3' to 5' direction, while the lagging strand is synthesized in the 5' to 3' direction.
- C. The leading strand is synthesized continuously, while the lagging strand is synthesized in fragments known as Okazaki fragments.
- D. DNA polymerase can synthesize the lagging strand without the need for an RNA primer.

[1 mark]

Question 6.

Which of the following processes explains how errors in DNA replication are corrected?

- A. DNA polymerase replaces damaged sections of DNA by cutting out the incorrect bases and inserting new ones.
- B. Mismatch repair enzymes recognize and correct incorrectly paired nucleotides that escaped proofreading during DNA replication.
- C. Helicase scans the DNA for mismatched nucleotides and corrects them by removing the errors.
- D. Topoisomerase eliminates errors in DNA structure by preventing supercoiling and stabilizing the DNA strands during replication.

[1 mark]

