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AQA, OCR, Edexcel

A Level

A Level Biology

DNA Probes and Hybridisation Questions

Name:

M M E

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Total Marks: /28

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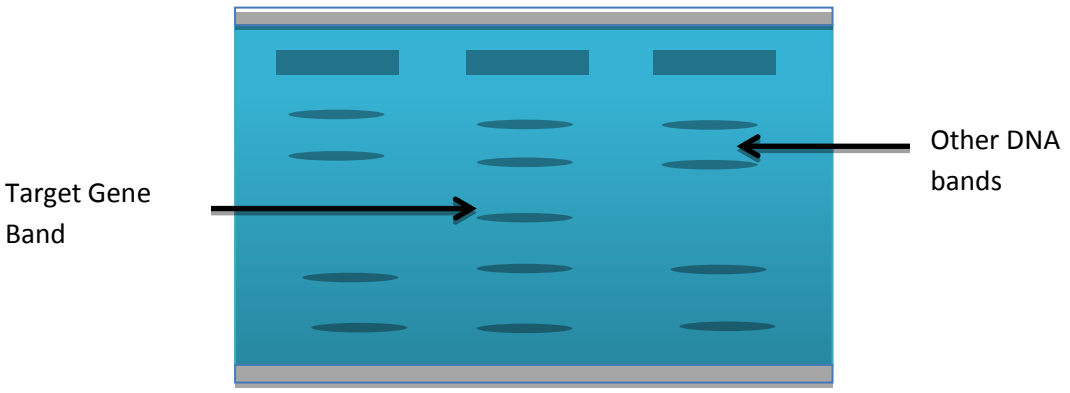
Probes and Hybridisation

1. The human genome is made up of 3 billion base pairs. Because of its vast size, scientists had to develop an efficient way to locate specific genes that are of interest.

   a)
   i) Suggest one reason why might it be useful for scientists to be able to locate a particular gene within the genome of an organism? (1 mark)

   ii) Explain the structure and function of a DNA probe. (4 marks)

   iii) The diagram below shows the results of probe hybridisation. How did scientists carrying out the experiment to create this? (3 marks)



iv) Explain the process of restriction mapping. (3 marks)

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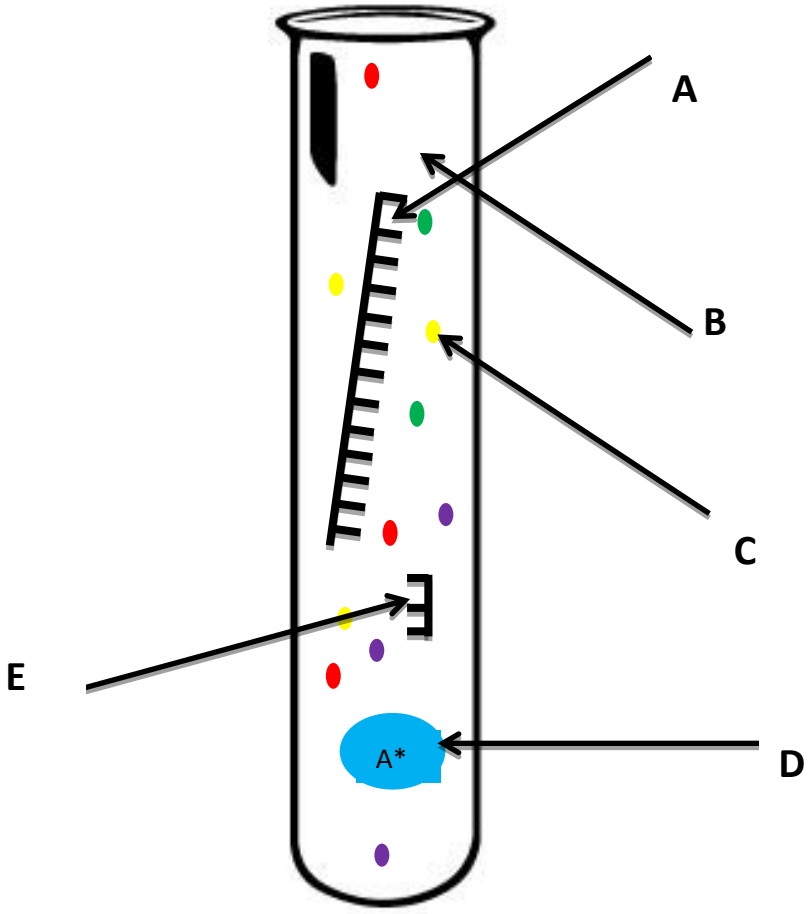
b) Gene sequencing is a technique that determines the order of bases in a section of DNA.

i) The diagram below shows all of the components needed to sequence a gene using what is called the Sanger Method. Identify components labelled A-E and explain their roles. (5 marks)

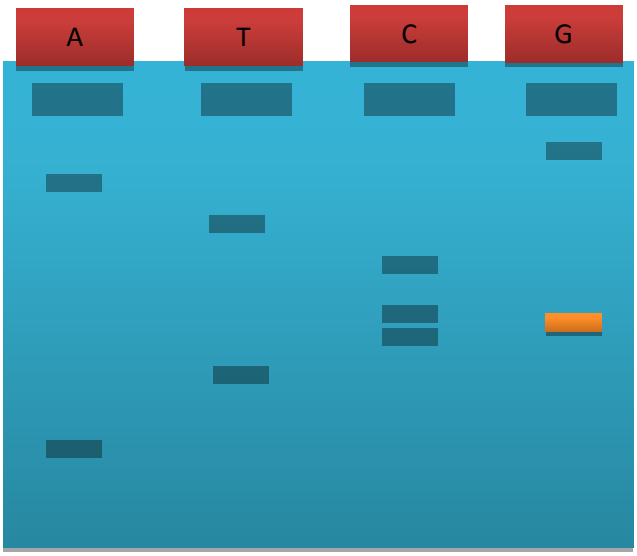


ii) Four test tubes are required for DNA sequencing, explain why. (1 mark)

iii) Why are the DNA strands produced all of different lengths? (2 marks)

iv) The diagram below shows the gel after the DNA fragments from all four test tubes have been separated by

electrophoresis and viewed under UV light.
What is the sequence of the DNA strand? (2 marks)



2. DNA probes have many practical and advantageous uses in modern science and medicine as many human diseases are caused by mutations in the genetic code.

   a) i) Why is a DNA microarray more efficient than using a probe to detect multiple genes? (1 mark)

   b) One of the prerequisites to genetic screening is genetic counselling.

      i) How might genetic counselling be useful to a woman who has a family history of breast cancer? (3 marks)

      ii) How could genetic screening be useful in choosing the most effective treatment in a cancer patient? (3 marks)

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