

My Question Paper

1. Meselson and Stahl investigated whether DNA replicated in a conservative or semiconservative way.

(a) What is meant by the term semiconservative replication? [2]

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(b) The bacterium *Escherichia coli* (E.coli) was cultured in a nutrient broth, containing the heavy isotope as a source of nitrogen ^{15}N instead of the normal ^{14}N . After several generations all of the DNA in all of the bacteria contained the heavy isotope ^{15}N . They were then washed and transferred to a ^{14}N medium and allowed to replicate. After each generation, bacteria were removed and ruptured to release the DNA. The DNA was then placed in a medium and spun in a centrifuge. The position of the DNA in the medium was then determined.

(i) Name the part of the DNA molecule which contained the ^{15}N . [1]

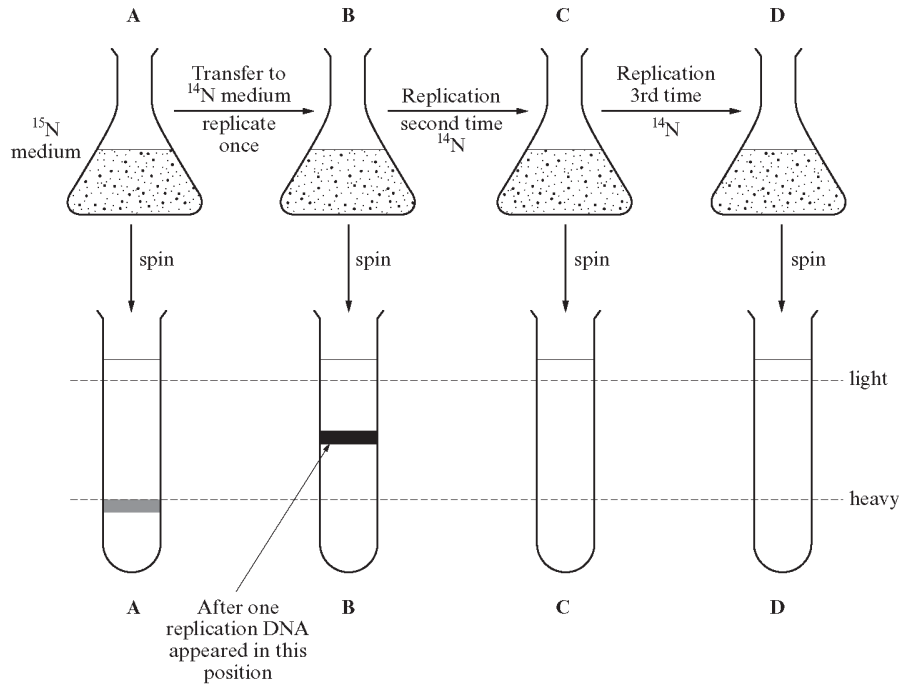
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(ii) If they wanted to show the relative position of DNA from different samples of bacteria, suggest **two** variables which would need to be controlled in the centrifugation process. [2]

1.

2.

(c) The diagram represents the results which they obtained.



(i) Explain why the results in tubes A and B support semiconservative replication. [3]

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(ii) Complete diagrams C and D to show the pattern and relative proportions of DNA you would expect. [2]

(Total 10 marks)

2. There are 2 types of nucleic acid: DNA and RNA.

(a) Complete the table below to describe **three** differences between the structure of DNA and RNA. [3]

DNA	RNA

(b) A sample of DNA was analysed, 23% of the nucleotides contained guanine. Calculate the percentage of nucleotides which contained adenine. Show your working. [2]

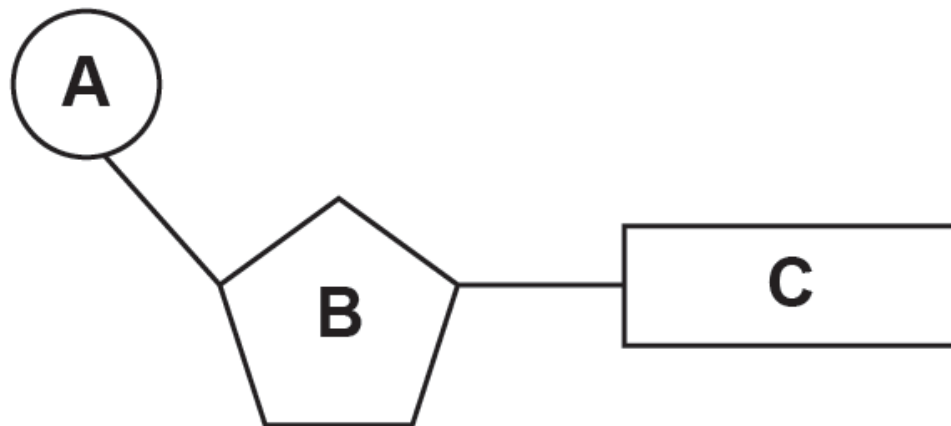
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(Total 5 marks)

3. The diagram below shows a component of DNA.



Name the parts **A**, **B** and **C**.

[3]

A

B

C

(b) Describe how a polymer of DNA would be different from a polymer of RNA.

[2]

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(c) (i) Name the stage in the cell cycle where DNA replication occurs.

[1]

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(i) (ii) Vincristine is a drug which prevents the spindle fibres from shortening. Name the stage in the cell cycle which would be affected.

[1]

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(iii) State **three** differences between daughter cells produced by the process of mitosis and those produced by meiosis.

[3]

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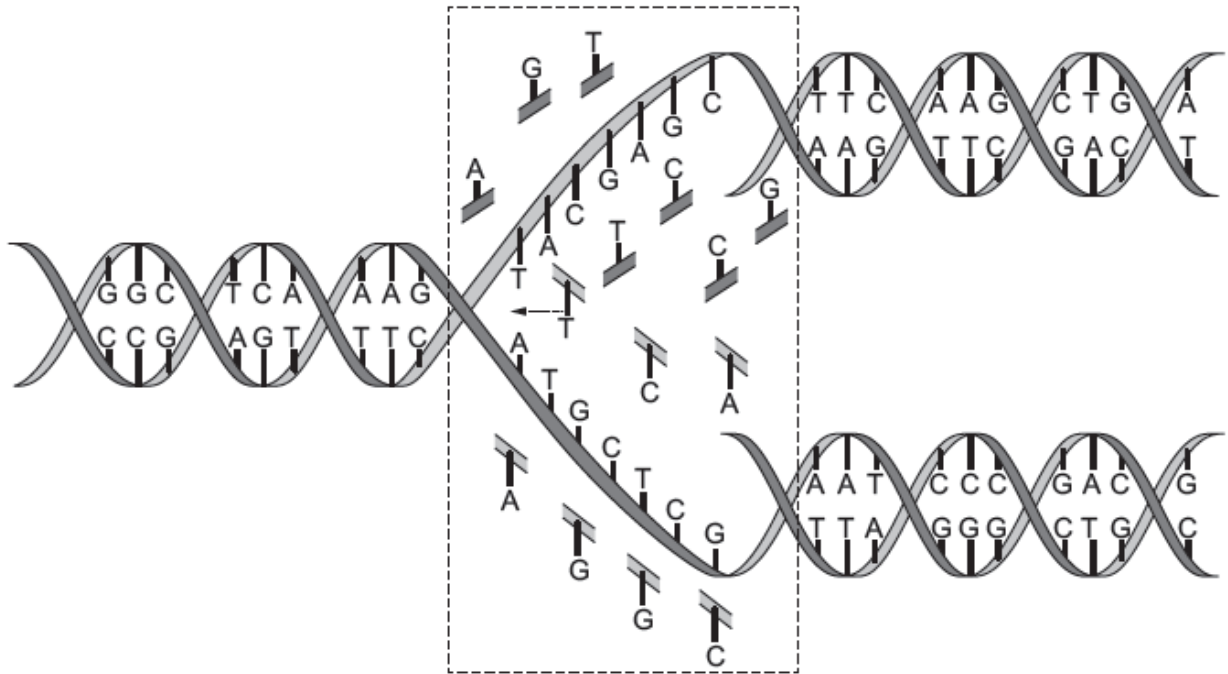
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4. The diagram below illustrates replication of DNA in cells.



(a) (i) Describe the sequence of events shown within the dotted rectangle in the diagram above.

[3]

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(ii) What is the role of DNA polymerase in the process?

[1]

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(b) Explain why the process is referred to as 'semi conservative'.

[2]

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5. Answer **one** of the following questions.
Any diagrams included in your answers must be fully annotated.

Either, (a) Describe how a nucleotide sequence on a DNA molecule results in the production of a polypeptide.

Or (b) Describe the principles and techniques involved in the cloning of plants. Give the advantages and disadvantages of this process.

[10]

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