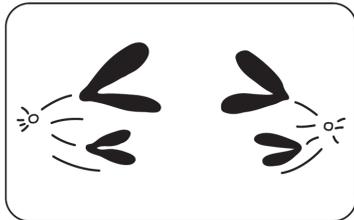


Chapter 11 The cell cycle

- 1 (a) Describe and explain how the structure of DNA results in accurate replication. (4 marks)
- (b) Describe the behaviour of chromosomes during mitosis and explain how this results in the production of two genetically identical cells. (7 marks)
- (c) A cancerous tumour is formed by uncontrolled mitotic division. This results in a mass of cells with an inadequate blood supply. Drugs are being developed which only kill cells in a low oxygen environment. Suggest how these drugs could be useful in the treatment of cancer. (2 marks)

AQA, 2006

- 2 (a) **Figure 1** shows a stage of mitosis in an animal cell.



- (i) Name this stage of mitosis.
- (ii) Describe and explain what happens during this stage which ensures that two genetically identical cells are produced.

(3 marks)

Figure 1

- (b) **Figure 2** shows the relative amounts of DNA per cell during two successive cell divisions in an animal.

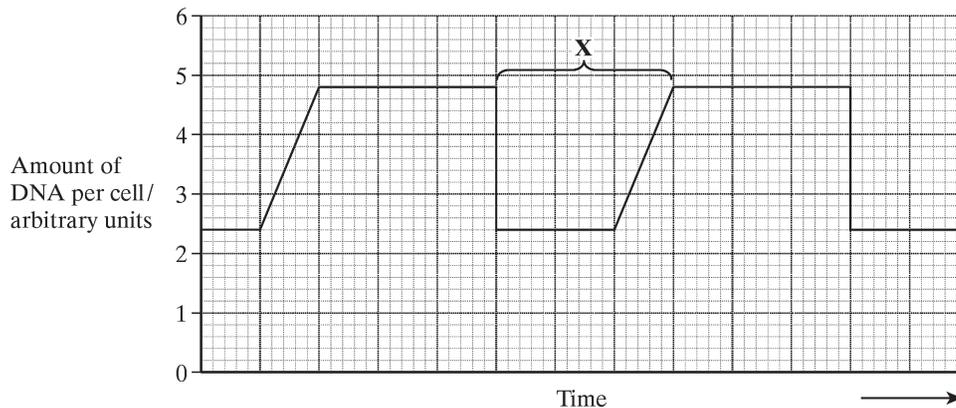


Figure 2

- (i) What stage of the cell cycle is shown by X? (2 marks)
- (ii) Apart from an increase in the amount of DNA, give **one** process which occurs during stage X which enables nuclear division to occur. (1 mark)
- (c) The table shows the average duration of each stage of the cell cycle in the cells of a mammalian embryo. Give **one** piece of evidence from the table which indicates that these cells are multiplying rapidly.

Stage	Mean duration / minutes
Interphase	12
Prophase	50
Metaphase	15
Anaphase	10
Telophase	42

AQA, 2005

- 3 (a) Explain why the replication of DNA is described as semi-conservative. (2 marks)
 (b) Bacteria require a source of nitrogen to make the bases needed for DNA replication.

In an investigation of DNA replication some bacteria were grown for many cell divisions in a medium containing ^{14}N , a light form of nitrogen. Others were grown in a medium containing ^{15}N , a heavy form of nitrogen. Some of the bacteria grown in a ^{15}N medium were then transferred to a ^{14}N medium and left to divide once.

DNA was isolated from the bacteria and centrifuged. The DNA samples formed bands at different levels, as shown in the diagram.

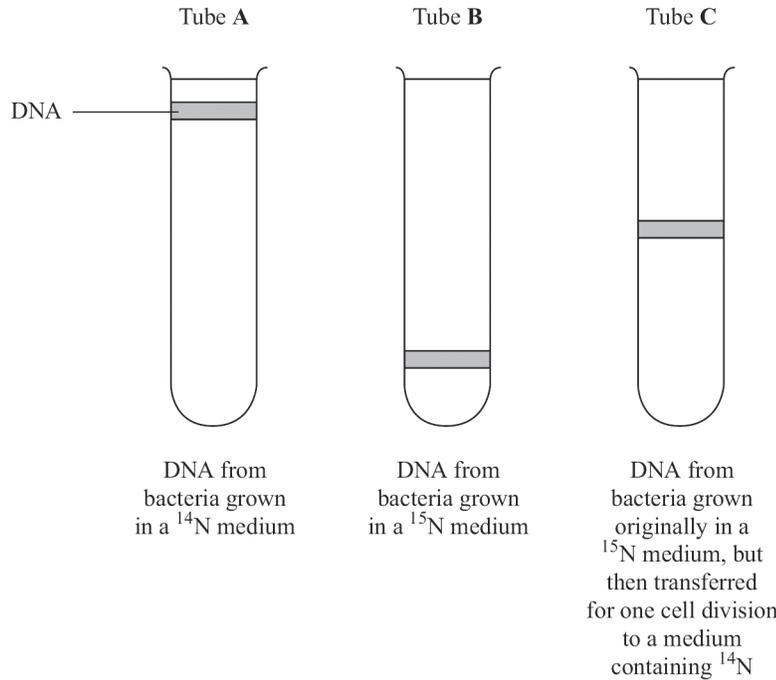


Figure 3

- (i) What do tubes A and B show about the density of the DNA formed using the two different forms of nitrogen?
 (ii) Explain the position of the band in tube C. (3 marks)
- (c) In a further investigation, the DNA of the bacterium was isolated and separated into single strands. The percentage of each nitrogenous base in each strand was found. The table shows some of the results.

	Percentage of base present			
DNA sample	Adenine	Cytosine	Guanine	Thymine
Strand 1	26		28	14
Strand 2	14			

Copy the table and use your knowledge of base pairing to complete it.

(2 marks)

AQA, 2006