

1. DNA is a double helix with each strand linked by a series of paired bases. There are four bases in DNA.

(a) The table shows the percentage of each base found in a sample of DNA taken from a rat.

Complete the table to give the names of the two missing bases.

Percentage of base	Name of base
28.6	Adenine
21.4	Guanine
28.6	
21.4	

(2)

(b) A DNA molecule contains 1000 base **pairs**. 30% of the bases are guanine.

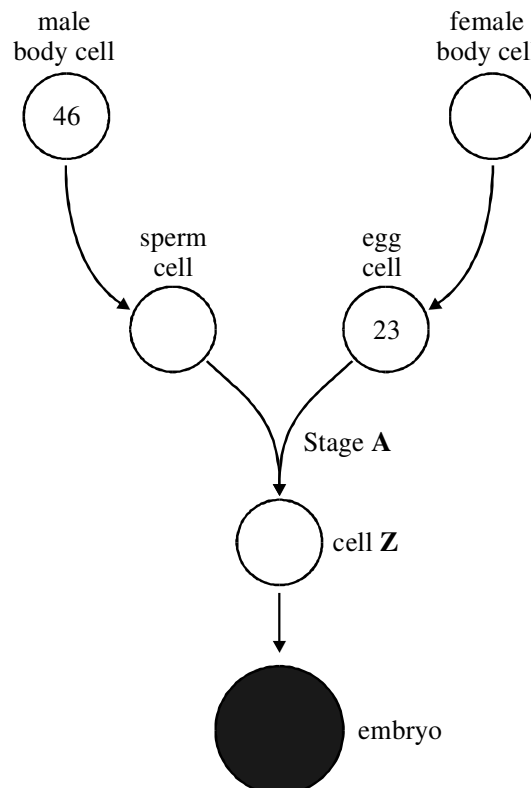
How many adenine bases are contained in this DNA molecule? Show your working.

Answer

(3)

(Total 5 marks)

2. The diagram shows stages in reproduction and the number of chromosomes in some cells.



(a) Complete the diagram by putting the correct number of chromosomes in the three empty circles. (3)

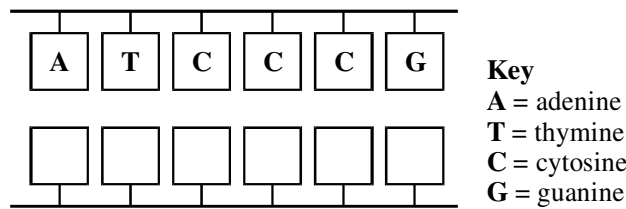
(b) What happens at stage A?
..... (1)

(c) (i) What is the name of cell Z?
..... (1)

(ii) How does cell Z develop into an embryo?
..... (1)
(Total 6 marks)

3. The gene to produce a human hormone was copied from the DNA of a human cell. During this process, an enzyme was used to make a double strand of DNA from a single strand of DNA.

(a) Complete each box by writing in **A**, **T**, **C** or **G** to show the bases of part of the double strand of DNA.



(2)

(b) Complete this sentence.
The two single strands of DNA coil together to form a shape called a
..... (1)

(c) The DNA was transferred to *E. coli* bacterial cells which were then grown in large numbers in a fermenter.
Name the process
(i) for the transfer of DNA from the human cell to the bacterium
..... (1)

(ii) for the production of **identical** bacteria

.....

(1)

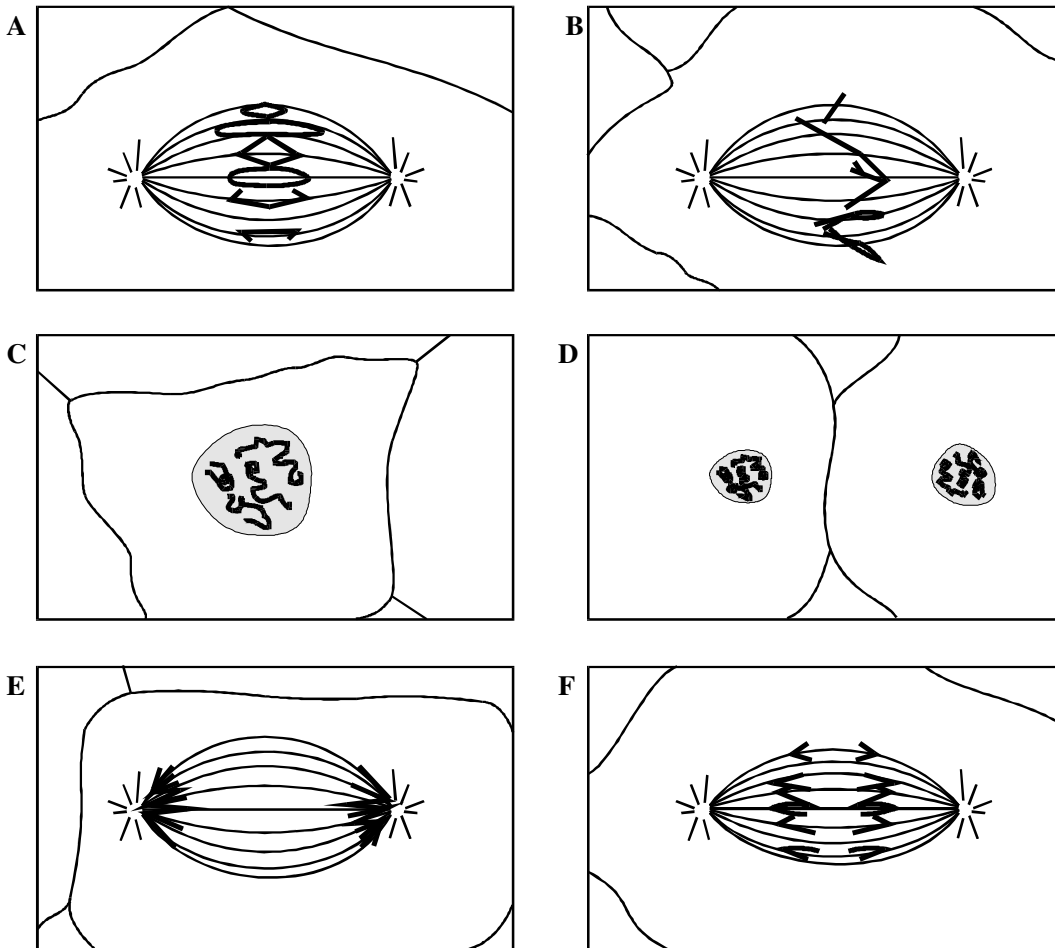
(d) Suggest **one** human hormone which may be produced by the bacteria as a result of a gene transfer.

.....

(1)

(Total 6 marks)

4. The diagrams A, B, C, D, E and F show an animal cell at different stages of mitosis.



- (a) Use the letter by each diagram to arrange these stages in the correct order. Write your answers in the table. The first and last stages have been done for you. Write **one** letter only in each box.

Stage in mitosis	Label letter
First stage	C
Second stage	
Third stage	
Fourth stage	
Fifth stage	
Sixth stage	D

(3)

- (b) What is the diploid chromosome number of this cell?

.....

(1)

- (c) Give **two** ways in which meiosis differs from mitosis.

1.

.....

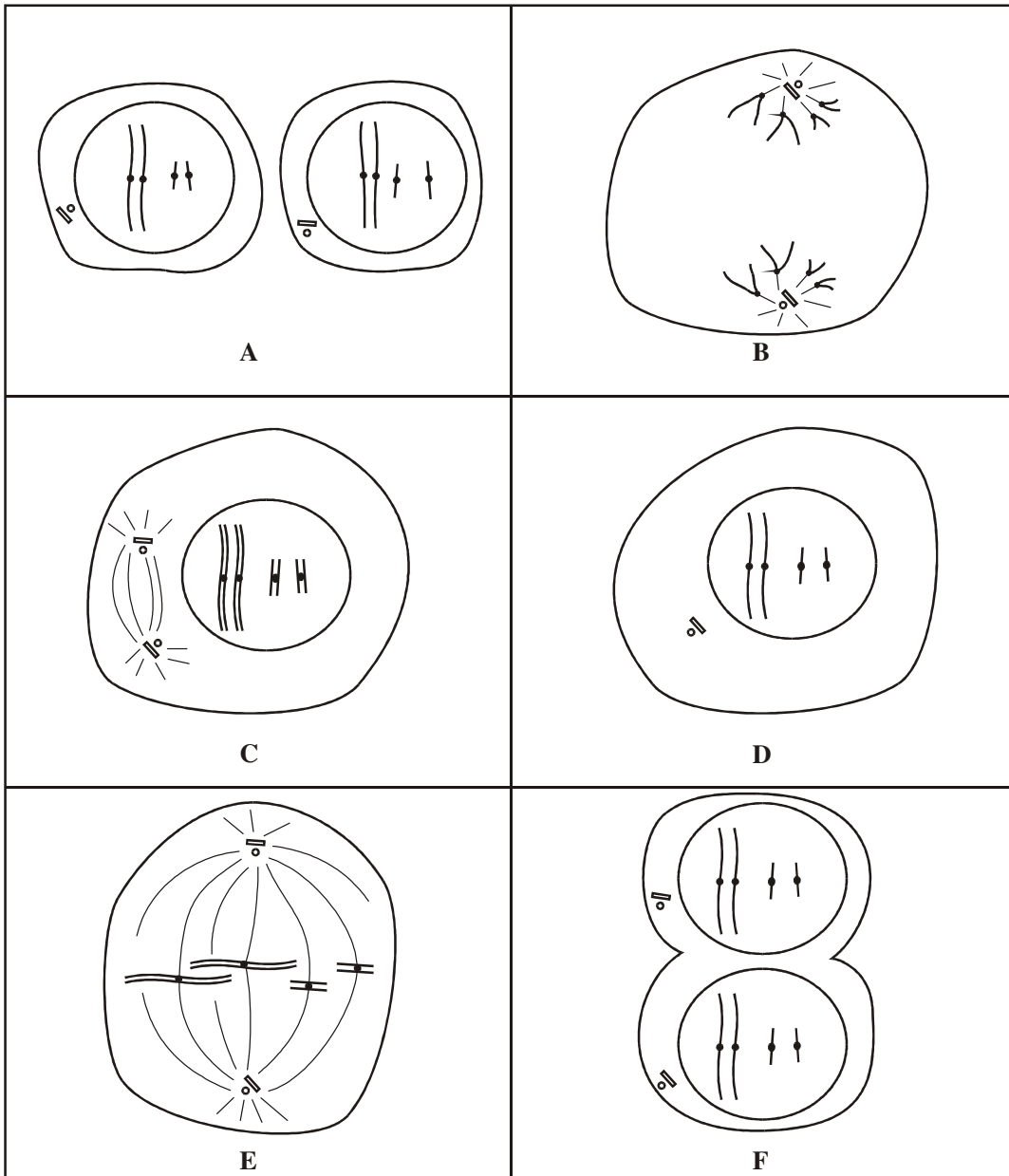
2.

.....

(2)

(Total 6 marks)

5. (a) The diagrams show stages in the process of an animal cell dividing during mitosis. The stages are in the wrong order.



Complete the table to show the correct order for cell division by mitosis.

number	1	2	3	4	5	6
letter						

(5)

- (b) Give **one** piece of evidence from the diagrams which shows that the cell is dividing by mitosis and not meiosis.

.....

(1)

- (c) State **one** function of each of the following types of cell division.

mitosis

.....

meiosis

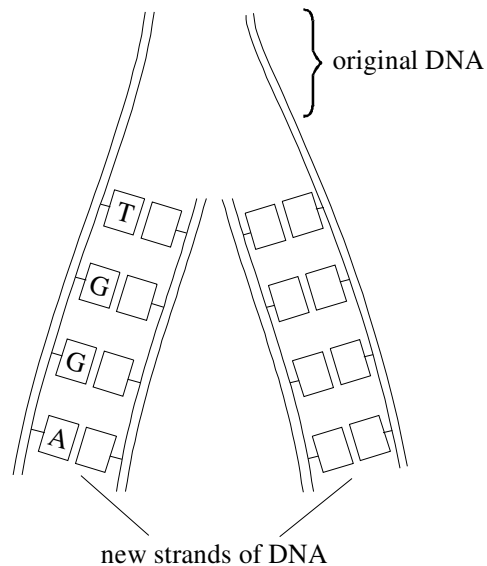
.....

(2)

(Total 8 marks)

6. (a) DNA copies itself exactly.
 Before a cell divides, two identical strands of DNA are formed.
 Complete the diagram to show how DNA copies itself.
 Fill in each box using the following symbols for the four bases:

Base	Symbol
adenine	A
cytosine	C
guanine	G
thymine	T



(2)

(Total 2 marks)