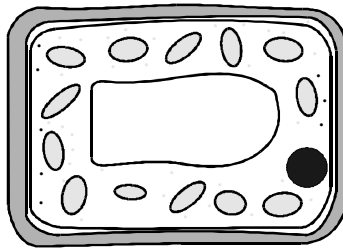


1. The diagram shows a plant cell.



- (a) Label **two** parts that are found in **both** animal and plant cells.
Use words from the box

cell membrane cell wall chloroplast cytoplasm nucleus

(4)

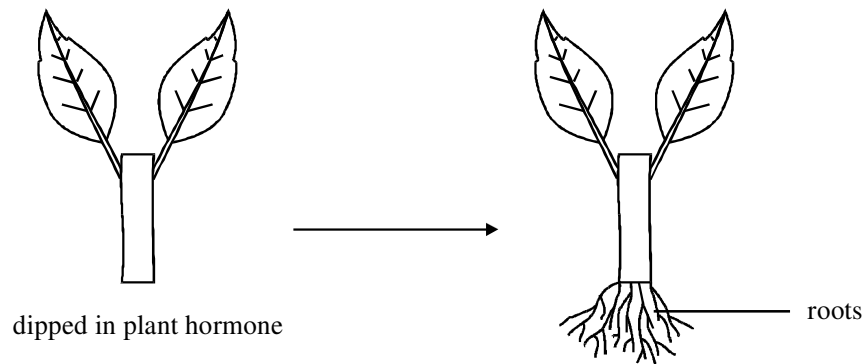
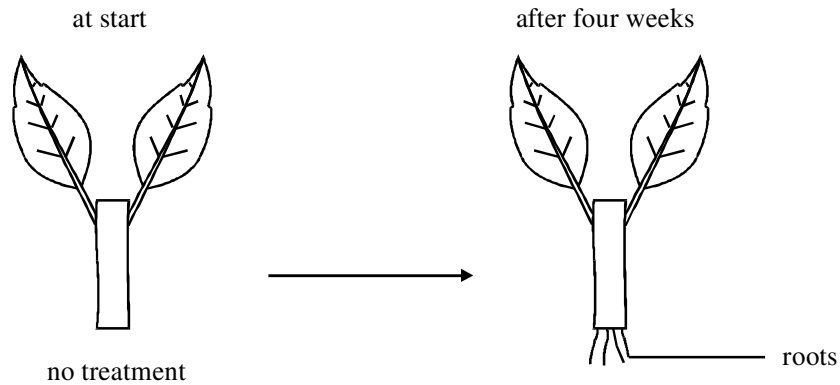
- (b) Choose the correct word from the box below to complete the following sentence.

cellulose protein starch

The cell wall is made of

(1)

- (c) Stephen took two similar cuttings from the stem of a plant. He dipped the end of one cutting in a plant hormone. Then he planted both cuttings in soil. After four weeks, he removed both cuttings from the soil. The diagram shows what they looked like.



- (i) What effect did the plant hormone have on the cutting?

.....

.....

.....

.....

(2)

- (ii) Suggest how this will help the cutting to survive.

.....

.....

(1)

(Total 8 marks)

2. 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.

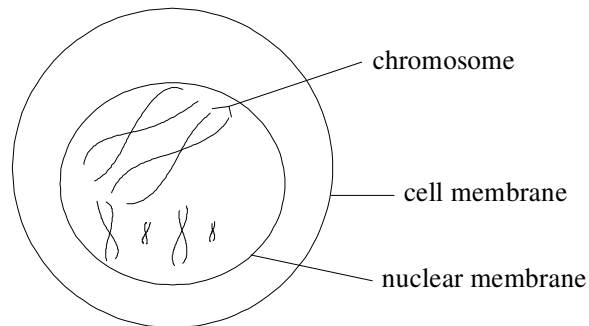
How many adenine bases are contained in this DNA molecule? Show your working.

Answer

(3)

(Total 5 marks)

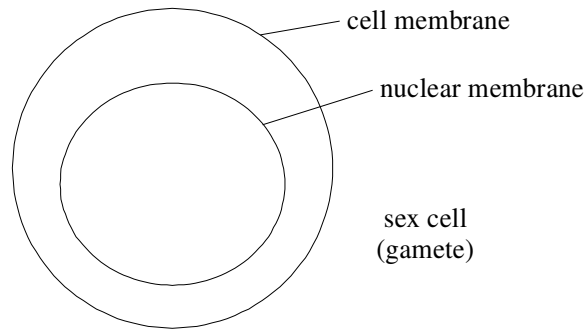
3. The diagram shows the start of the cell division that produces sex cells (gametes) in an animal.



(a) What is the diploid number in this animal?

(1)

(b) Complete the diagram to show the chromosomes in a sex cell (gamete).



(1)

(c) What is the name of this type of cell division?

.....

(1)

(Total 3 marks)

4. Use words from the box to complete the passage.

allele	cell	chromosome	egg	environment
gene	nucleus	sperm	variation	

Chromosomes are located in a which is surrounded by cytoplasm.

Each consists of a row of genes.

An is one form of a gene, for example, for brown hair or blond hair.

Differences between organisms of the same species are known as

This can be caused by the as well as by genes.

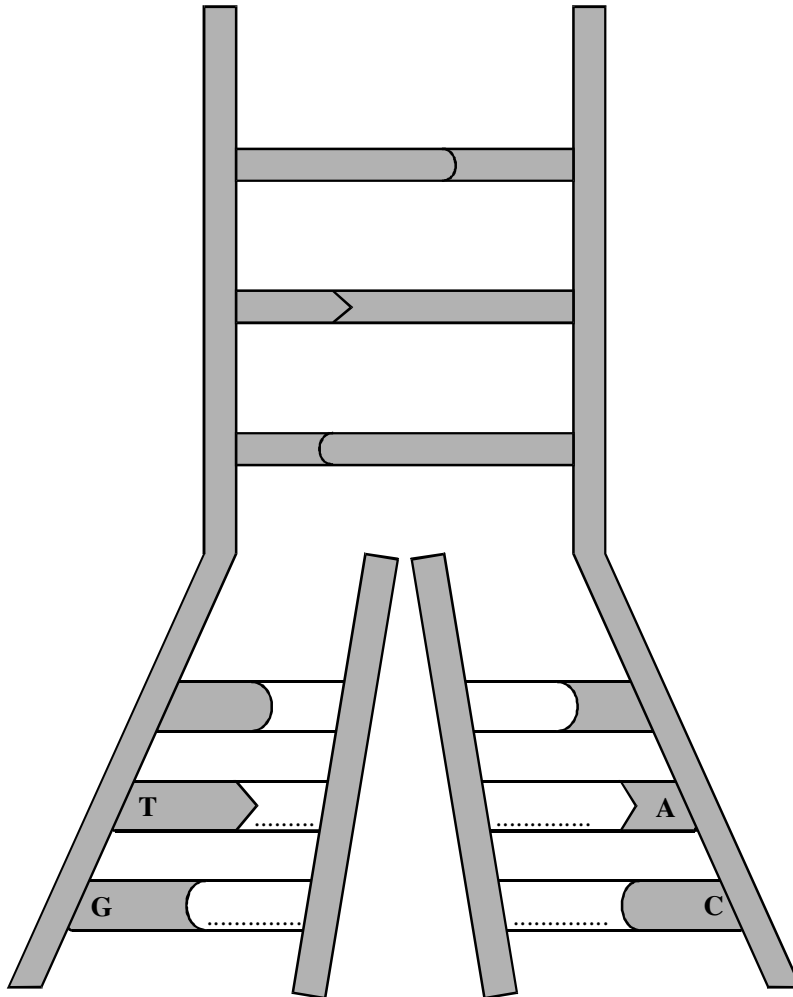
(5)

(Total 5 marks)

5. When new DNA molecules are made in a cell, the DNA molecule first separates into two strands.

The diagram shows how an exact copy of each strand is then made.

The sequence of bases (A, C, G and T) stores information in the DNA.



- (a) On the diagram, put the correct letter for each missing base on **both** the new DNA strands to make them exact copies of the original.

(2)

(b) Each sequence of three bases is the code for an amino acid.

DNA code	amino acid
GCA	arginine
CAC	valine
ACG	cysteine
GTG	histidine
GTC	glutamine

Which amino acids will these DNA sequences make? Read from left to right.

(i) CACGTC

.....

(2)

(ii) ACGGCA

.....

(2)

(c) Where is DNA found in a cell?

.....

(1)

(Total 7 marks)

6. The hormone insulin is a protein. It was one of the first proteins examined in detail to find out its chemical structure.

The table shows the DNA template code for seven amino acids found in the insulin molecule.

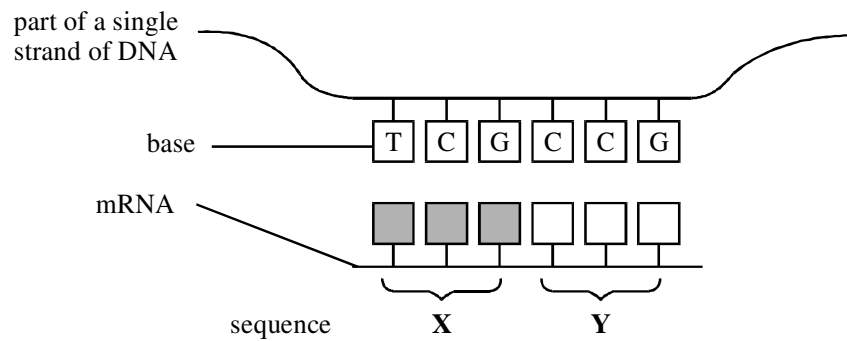
DNA template code	amino acid
AAA	phenylalanine
GTC	glutamine
ACG	cysteine
GTG	histidine
TTG	asparagine
GAG	leucine
CAC	valine

Complete the table below.

amino acid	DNA template code	mRNA code	tRNA code
phenylalanine	.....	UUU	AAA
.....	TTG	.....	UUG
valine	.....	.....	CAC
.....	.....	CUC	.....

(8)
(Total 8 marks)

7. (a) The diagram shows the production of mRNA.

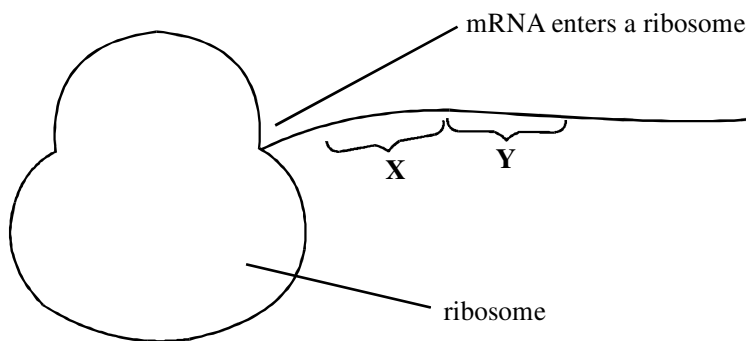
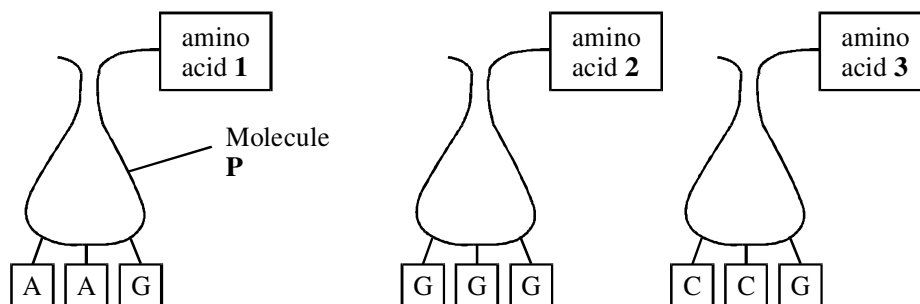


(i) Complete the sequence of bases on the MRNA at Y. (1)

(ii) Where in the cell is MRNA made?

..... (1)

(b) These diagrams show other structures involved in protein synthesis.



(i) Molecule **P** delivers an amino acid to the ribosome.
Name molecule **P**.

.....

(1)

(ii) Where in the cell is molecule **P** found?

.....

(1)

(iii) Which amino acid (**1**, **2** or **3**) does the mRNA sequence **Y** code for?

.....

Explain your answer.

.....

.....

(2)

(c) (i) Insulin is composed of 51 amino acids.

What is the minimum number of bases necessary to code for insulin?

.....

(1)

(ii) Explain your answer.

.....

(1)
(Total 8 marks)