1 (a Four definitions of terms used in genetics are shown in Table 5.1.

Table 5.1

definitions	
the outward appearance of an organism	……………………..
a length of DNA that codes for a protein	……………………..
having one set of chromosomes	……………………..
type of nuclear division which gives daughter nuclei that are genetically identical	…………………….

For each of the definitions, select an appropriate term from the list and write it in the box provided.

chromosome	genotype	mitosis
diploid	haploid	mutation
dominant	heterozygous	phenotype
gene	homozygous	recessive

[4]

(b) A couple who have blood groups **A** and **B** have four children. Each child has a different blood group.

Use the space below to draw a genetic diagram to show how this is possible. Use the symbols, I^A , I^B and I^o, for the alleles.

parental blood groups   **A**   ×   **B**

parental genotypes   ……………… × ………………

gamete genotypes   ………………   ………………

children's genotypes   …………   …………   …………   …………

children's blood groups   …………   …………   …………   …………

[4]

(c) Explain what is meant by *codominance*. You may refer to the genetic diagram in **(b)** to help you with your answer.

....

....

....

....

....

....

.... [3]

(d) Insulin produced by genetically engineered bacteria first became available in 1982. Before 1982, insulin had been prepared from dead animal tissues.

Explain the **advantages** of using insulin produced by genetically engineered bacteria rather than insulin from dead animal tissues.

....

....

....

....

....

....

.... [3]

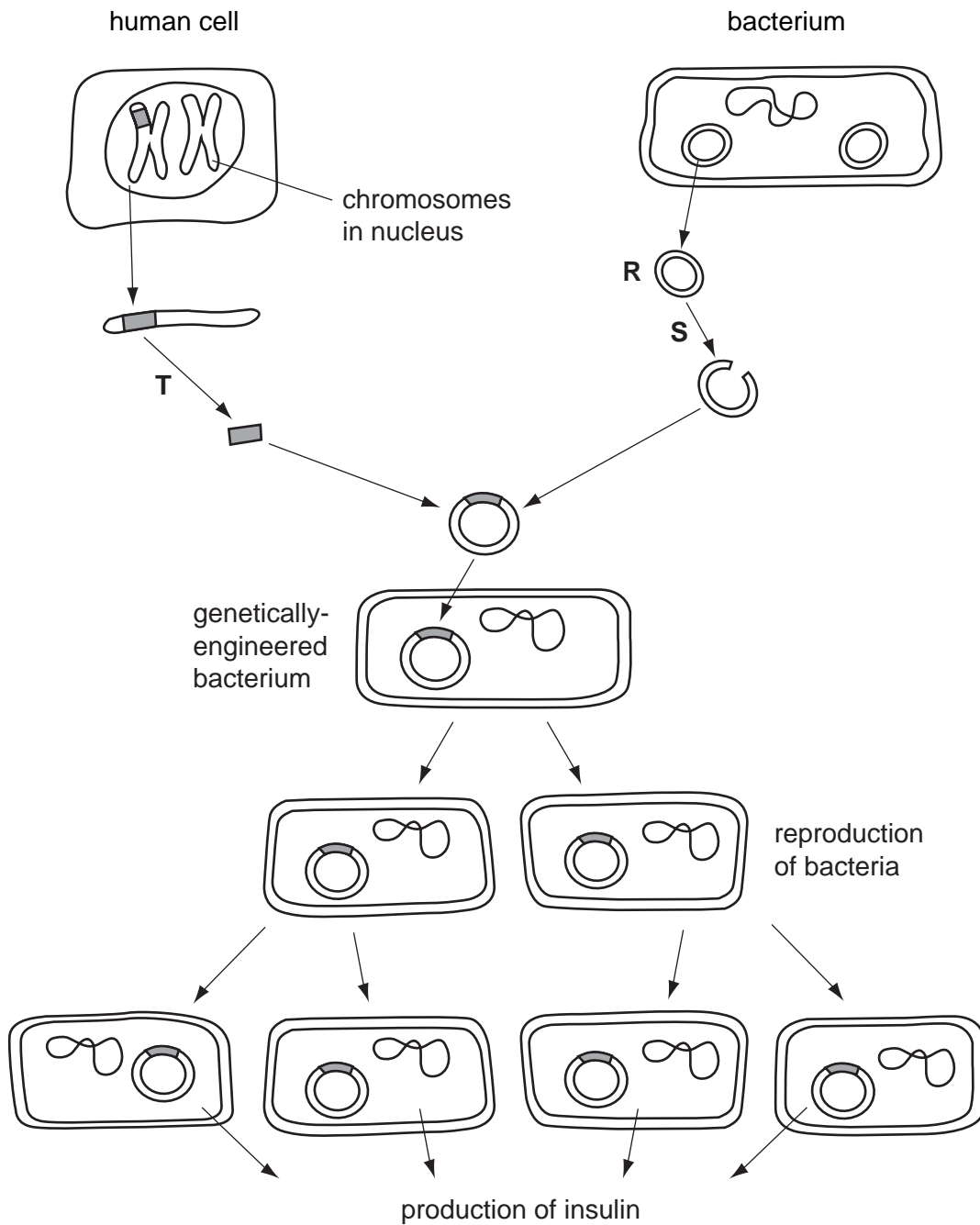**(e)** Fig. 5.1 shows some of the steps involved in the genetic engineering of bacteria.

Fig. 5.1

(i) Name structure **R** and state what it is made from.

.... [2]

(ii) State what is added at stages **S** and **T**.

.... [1]

[Total: 17]

2   Fig. 4.1 shows three species of zebra.

Equus burchelli

Equus grevyi

vertical stripe

horizontal stripe

Equus zebra

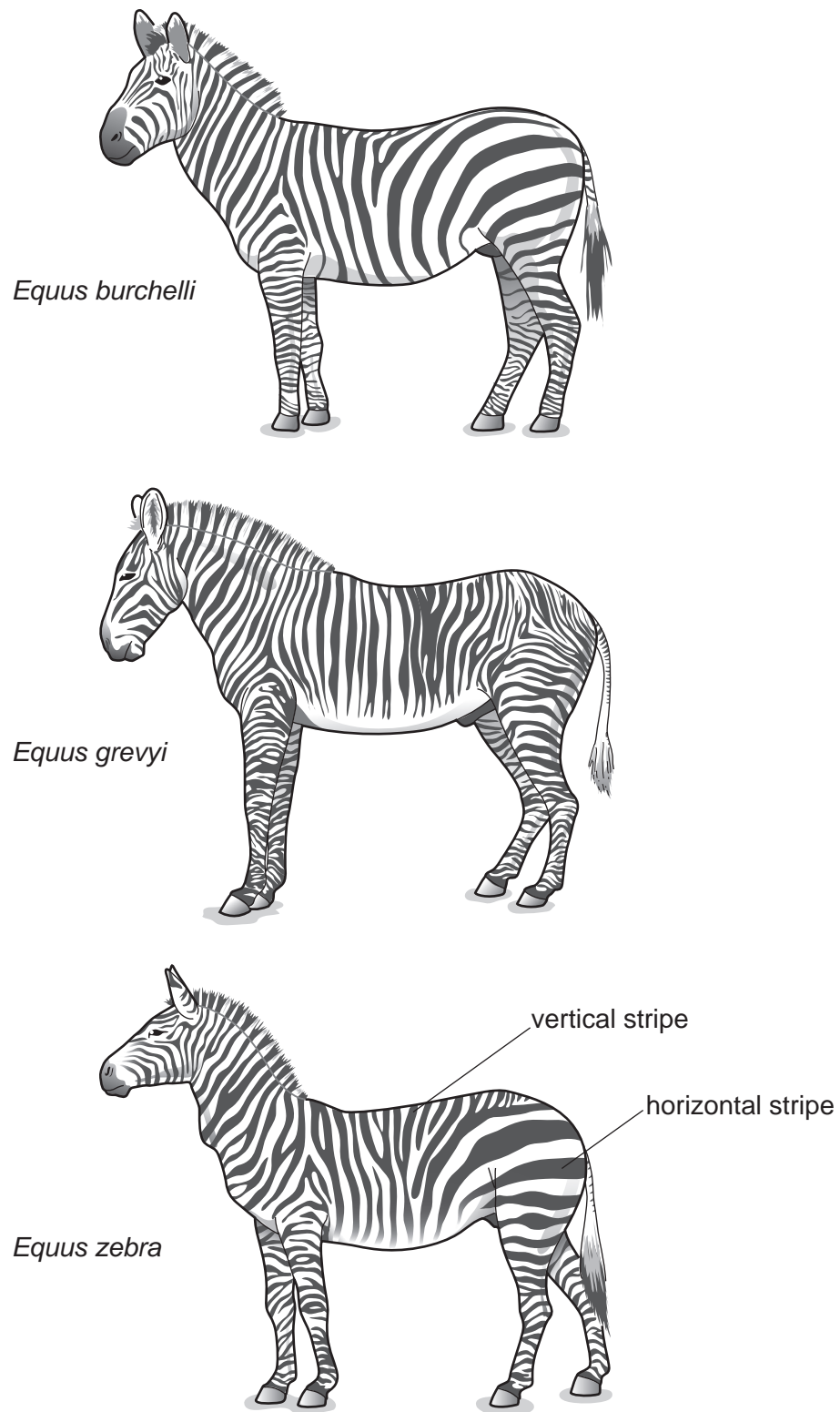**Fig. 4.1**

(a) Describe **one** method a scientist could use to show that the zebras shown in Fig. 4.1 are different species.

....

.... [1]

(b) Studies have shown that the hotter the environment, the more stripes zebras have.

(i) State the type of variation which would result in different numbers of stripes.

.... [1]

(ii) Study Fig. 4.1. Suggest which species of zebra lives in the hottest environment.

.... [1]

(c) Occasionally, zebras are born that are almost completely black. The change in appearance is the result of mutation.

(i) State the term that is used to describe the appearance of an organism.

.... [1]

(ii) Define the term *mutation*.

....

.... [2]

(d) Tsetse flies attack animals with short fur, sucking their blood and spreading diseases.

Fig. 4.2 shows a tsetse fly. This fly is an insect, belonging to the arthropod group.
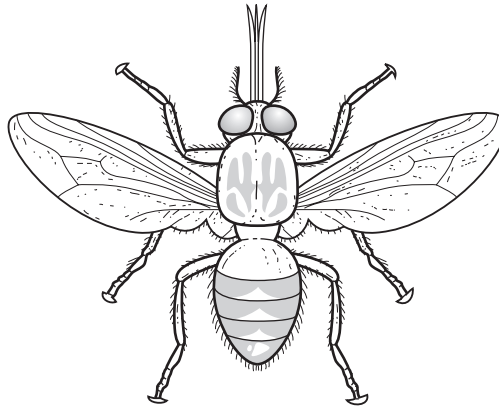

Fig. 4.2

(i) State **one** feature, **visible in Fig. 4.2**, which is common to all arthropods.

.... [1]

(ii) State two features, **visible in Fig. 4.2**, which distinguish insects from other arthropod groups.

1. ....

2. .... [2]

(e) Scientists have discovered that zebras with more horizontal stripes attract fewer tsetse flies.

(i) Suggest why the stripes on the head and neck of the zebra would be an advantage when it feeds on grass on the ground.

....

.... [2]

(ii) Describe how a species of zebra could gradually develop more horizontal stripes.

....

....

....

.... [3]

[Total: 14]

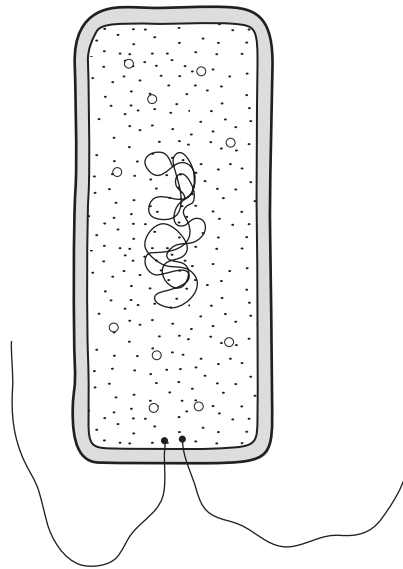3   Fig. 1.1 shows a diagram of a bacterial cell.

Fig. 1.1

(a) (i) State four structural features, present in a photosynthesising plant cell, that make it different from the bacterial cell in Fig. 1.1.

1. ....

2. ....

3. ....

4. .... [4]

(ii) State two structural features present in both the bacterial cell in Fig 1.1 and in an animal cell, such as a liver cell.

1. ....

2. .... [2]

(b) Bacteria are examples of microorganisms.

State two different types of food manufactured using microorganisms.

1. ....

2. .... [2]

(c) Many bacterial diseases can no longer be treated with antibiotics. Outline how antibiotic-resistant strains of bacteria can develop.

....

....

....

.... [3]

(d) Explain why bacteria, in particular, are very useful organisms in the process of genetic engineering.

....

....

.... [2]

[Total: 13]