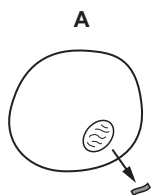


39 Why is pectinase useful in fruit juice production?

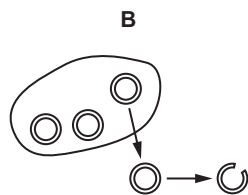
- A** Cloudier juice is produced.
- B** More juice can be extracted from the fruits.
- C** Proteins in the fruit are digested.
- D** Starch is digested to produce more sugar.

40 The diagrams show the stages in the production of human insulin.

Which stage uses the enzyme DNA ligase?



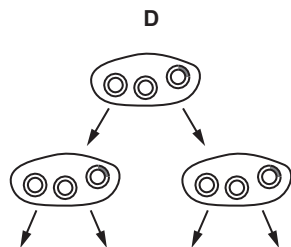
The gene for insulin is identified and removed from a human cell.



A plasmid is removed from a bacterium and cut open.



The gene for insulin is inserted into the plasmid.



The plasmid is inserted into a bacterium that reproduces, and insulin is produced.

40 Human insulin can be produced in large quantities by genetically modified bacteria.

Four of the steps in the processes of genetic modification and insulin production are listed.

- 1 Insulin is removed from the bacterial culture.
- 2 An enzyme is used to cut out the insulin gene from a human chromosome.
- 3 The insulin gene is placed into the plasmid of a bacterium.
- 4 Bacteria with the insulin gene reproduce very rapidly.

What is the order of these steps?

- A** 1 → 2 → 3 → 4
- B** 2 → 3 → 4 → 1
- C** 3 → 2 → 4 → 1
- D** 4 → 1 → 2 → 3

2 (a) Dicotyledons and monocotyledons belong to the plant kingdom.

(i) State **two** main features of plants.

1

2

[2]

(ii) State the names of **two** other kingdoms.

1

2

[2]

(b) Fig. 2.1 is a diagram of a cross-section of a monocotyledonous stem.

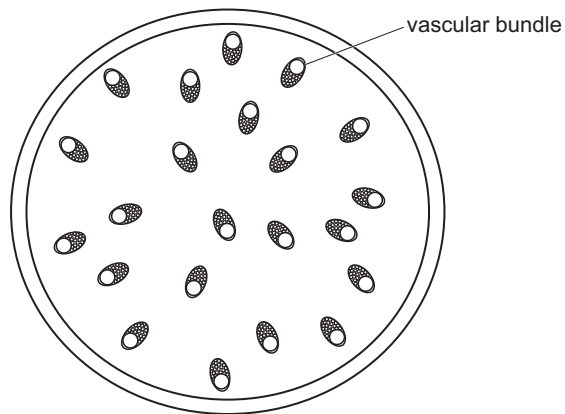


Fig. 2.1

Describe how the distribution of vascular bundles in a dicotyledonous stem would differ from the monocotyledonous stem shown in Fig. 2.1.

.....

.....

..... [1]

(c) Fig. 2.2 is an incomplete drawing of a cross-section of a dicotyledonous root.

Complete Fig. 2.2 by:

- sketching the distribution of phloem and xylem
- labelling the phloem, xylem and a root hair.

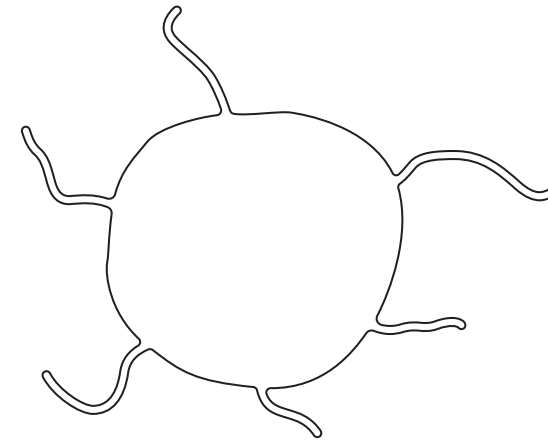


Fig. 2.2

[3]

(d) State **two** functions of xylem.

1

2

[2]

- (e) A farmer investigated the effect of girdling on the mass of apple fruit produced by apple trees.

The farmer removed a 3mm strip of bark and phloem tissue from the branches that produce the fruit, as shown in Fig. 2.3.

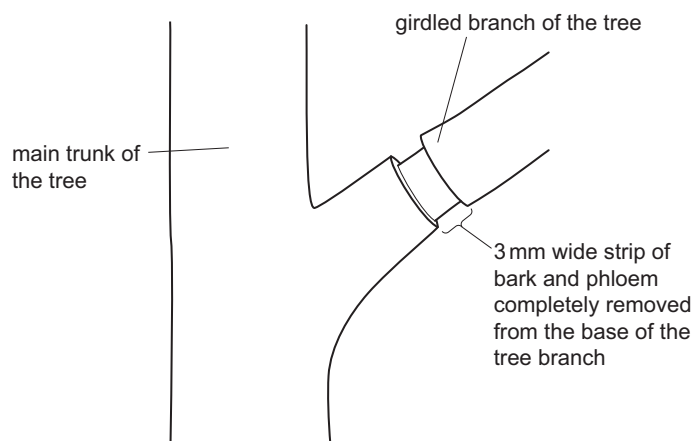


Fig. 2.3

The farmer girdled nine apple trees and left nine apple trees ungirdled.

The mass of ten fruits from the girdled trees and the mass of ten fruits from the ungirdled trees were compared.

Table 2.1 shows the results.

Table 2.1

treatment of trees	mass of ten fruits/g
girdled	1796
ungirdled	958

Describe the results shown in Table 2.1 **and** suggest an explanation for them.

[5]

- (f) Apples are used to make apple juice.

State **one** enzyme used in fruit juice production.

..... [1]

[Total: 16]

- 6 (a) An athlete monitored their heart rate and breathing rate before, during and after vigorous exercise.

Fig. 6.1 shows the results.

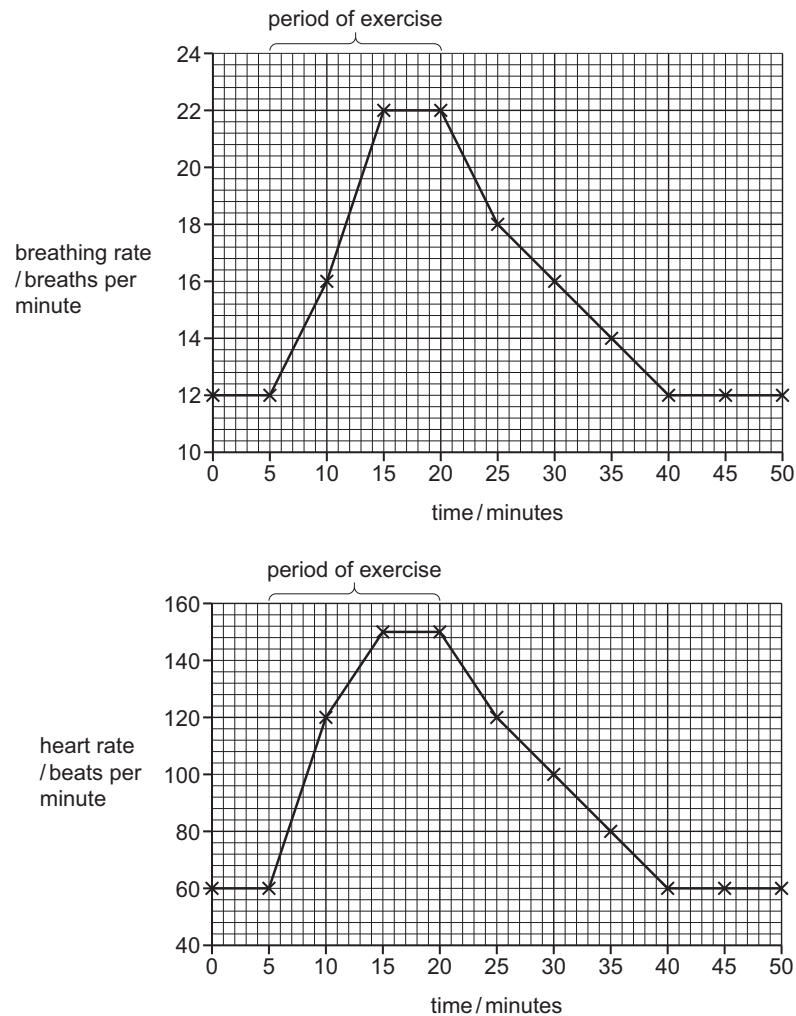


Fig. 6.1

Complete the sentences to describe **and** explain the results shown in Fig. 6.1.

After exercise, it takes minutes for the athlete's breathing rate to return to its resting rate.

The heart rate decreases by beats per minute between 20 and 40 minutes.

The heart rate and breathing rate do not immediately return to their resting rates because anaerobic respiration has occurred.

Lactic acid has built up in causing an oxygen

The heart rate remains high to transport lactic acid to the

The breathing rate remains high to supply for the respiration of lactic acid.

[7]

- (b) The carbon dioxide produced during exercise is excreted. Urea is another substance that is excreted.

(i) State the name of the organ that produces urea.

..... [1]

(ii) State the name of the organ that excretes urea.

..... [1]

- (c) State the balanced chemical equation for anaerobic respiration in yeast.

..... [2]

- (d) State **one** food product that is made using anaerobic respiration in yeast.

..... [1]

[Total: 12]

40 Some of the processes involved in the production of insulin by genetic modification are listed.

- 1 cutting of bacterial plasmid DNA with restriction enzymes
- 2 expression in bacteria of the human gene to make insulin
- 3 insertion of recombinant plasmids into bacteria
- 4 multiplication of bacteria containing recombinant plasmids

In which order do these processes occur?

- A** 1 → 3 → 4 → 2
- B** 2 → 1 → 3 → 4
- C** 3 → 1 → 2 → 4
- D** 4 → 1 → 3 → 2