

1 Fig. 6.1 shows the changes in glucose concentration of the blood.

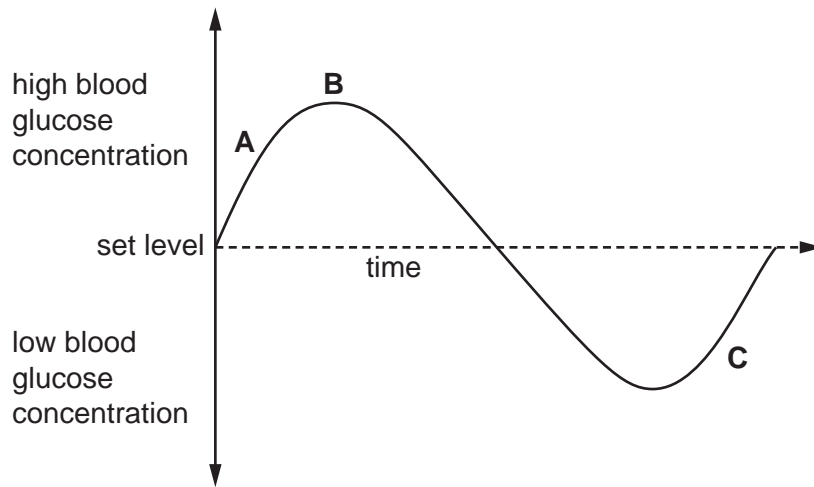


Fig. 6.1

(a) Name the process that maintains blood glucose concentration within set limits.

..... [1]

(b) (i) Name the hormone that would be secreted in response to the increasing blood glucose concentration at **A** in Fig. 6.1.

..... [1]

(ii) Name an organ that is responsible for the decrease in blood glucose concentration after **B** in Fig. 6.1.

..... [1]

(iii) Name the compound that is converted to glucose at **C** in Fig. 6.1.

..... [1]

(c) Describe the symptoms **and** treatment of Type 1 diabetes.

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[5]

[Total: 9]

2 Fig. 2.1 shows part of the nitrogen cycle.

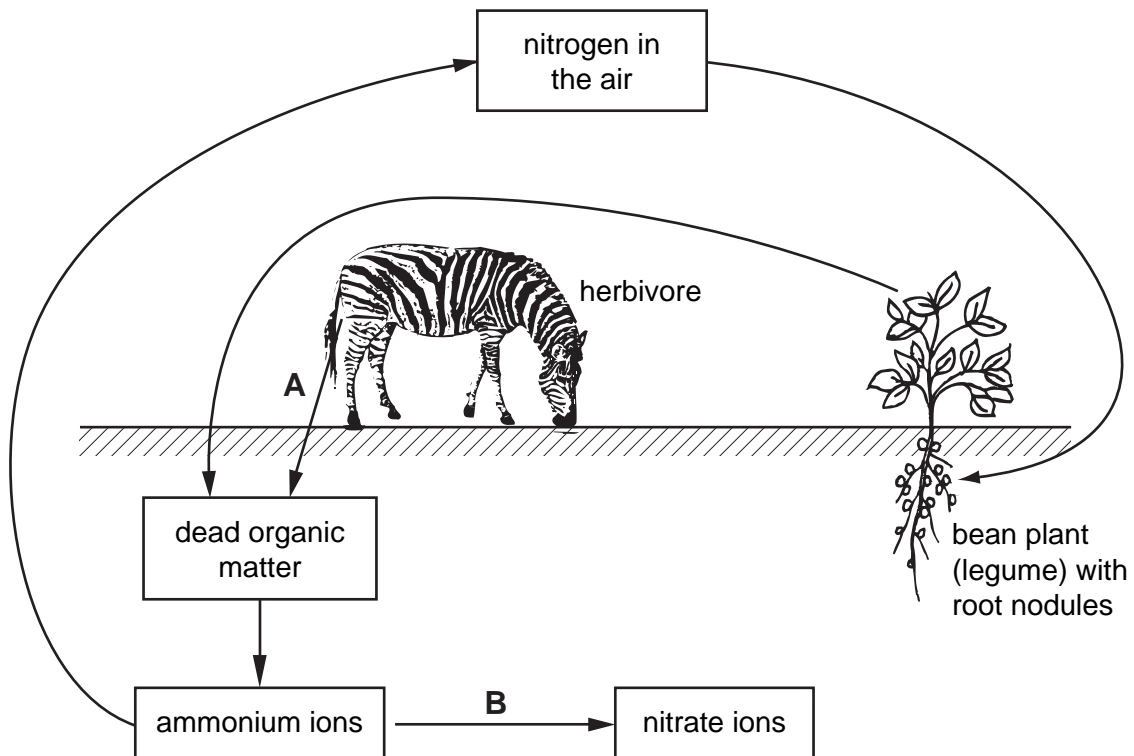


Fig. 2.1

(a) Name the processes **A** and **B** shown in Fig. 2.1.

A

B [2]

(b) Fig. 2.1 shows that legumes have root nodules.

Explain why these root nodules are important in the nitrogen cycle.

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..... [4]

(c) Proteins and DNA are important nitrogen-containing compounds in cells.

Describe the roles of proteins and DNA in cells.

proteins

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..... [3]

DNA

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..... [2]

(d) Many inorganic fertilisers contain compounds of nitrogen. If crop plants do not absorb the fertilisers they can be lost from the soil and pollute freshwater ecosystems, such as lakes and rivers.

Describe how fertilisers may affect freshwater ecosystems.

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..... [4]

[Total: 15]

3 Proteins in the blood are involved in protection of the body.

Three proteins found in the blood are

- antibodies
- thrombin
- fibrinogen

(a) (i) Name the type of white blood cell that produces antibodies.

..... [1]

(ii) Outline how antibodies protect the body.

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..... [2]

(b) Thrombin is an enzyme that catalyses the reaction:



(i) State when this reaction occurs.

..... [1]

(ii) Explain how fibrin protects the body.

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..... [3]

An investigation was carried out to determine the effect of different temperatures on the activity of thrombin. The results are shown in Fig. 4.1.

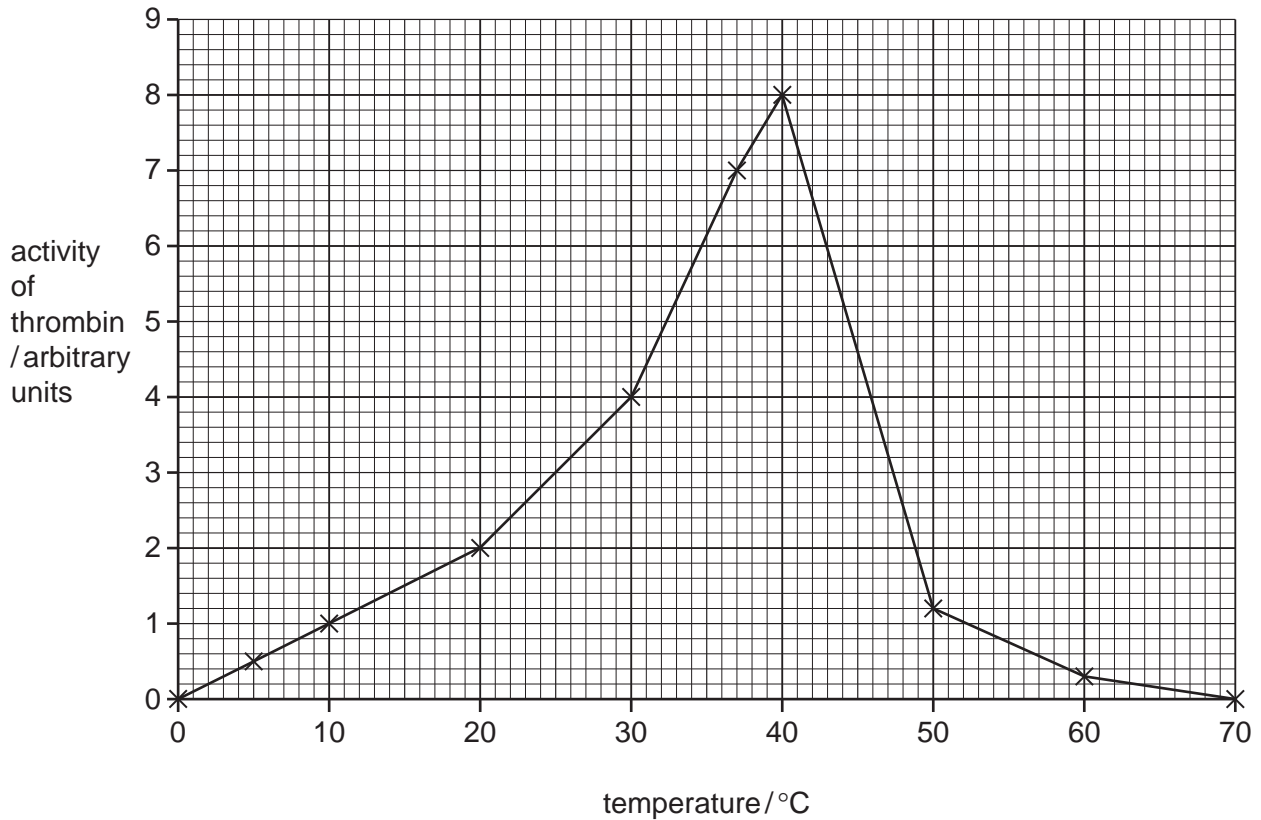


Fig. 4.1

(c) (i) Explain why thrombin functions slowly at 5 °C and does not function at all at 70 °C.

5 °C

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70 °C

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..... [3]

(ii) Suggest how the activity of thrombin was determined.

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..... [1]

(iii) State **two** conditions that would have been kept constant during the investigation.

1
2 [2]

[Total: 13]

4 (a) (i) Explain the term *balanced diet*.

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..... [3]

(ii) State **three** factors that influence a person's nutritional needs.

1 [3]

2

3

- (b) Glucose is absorbed in the small intestine and transported in the blood. The kidneys filter the blood and reabsorb the glucose.

If the blood contains more than 180 mg of glucose per 100 cm³, the kidney cannot reabsorb it all and some is present in the urine. This figure is called the **renal threshold**.

A doctor suspects that a patient has diabetes because a urine test is positive for glucose.

The patient takes a glucose tolerance test by drinking a solution of glucose. The doctor records the patient's blood glucose concentration at 30 minute intervals for five and a half hours.

The results are plotted on Fig. 2.1.

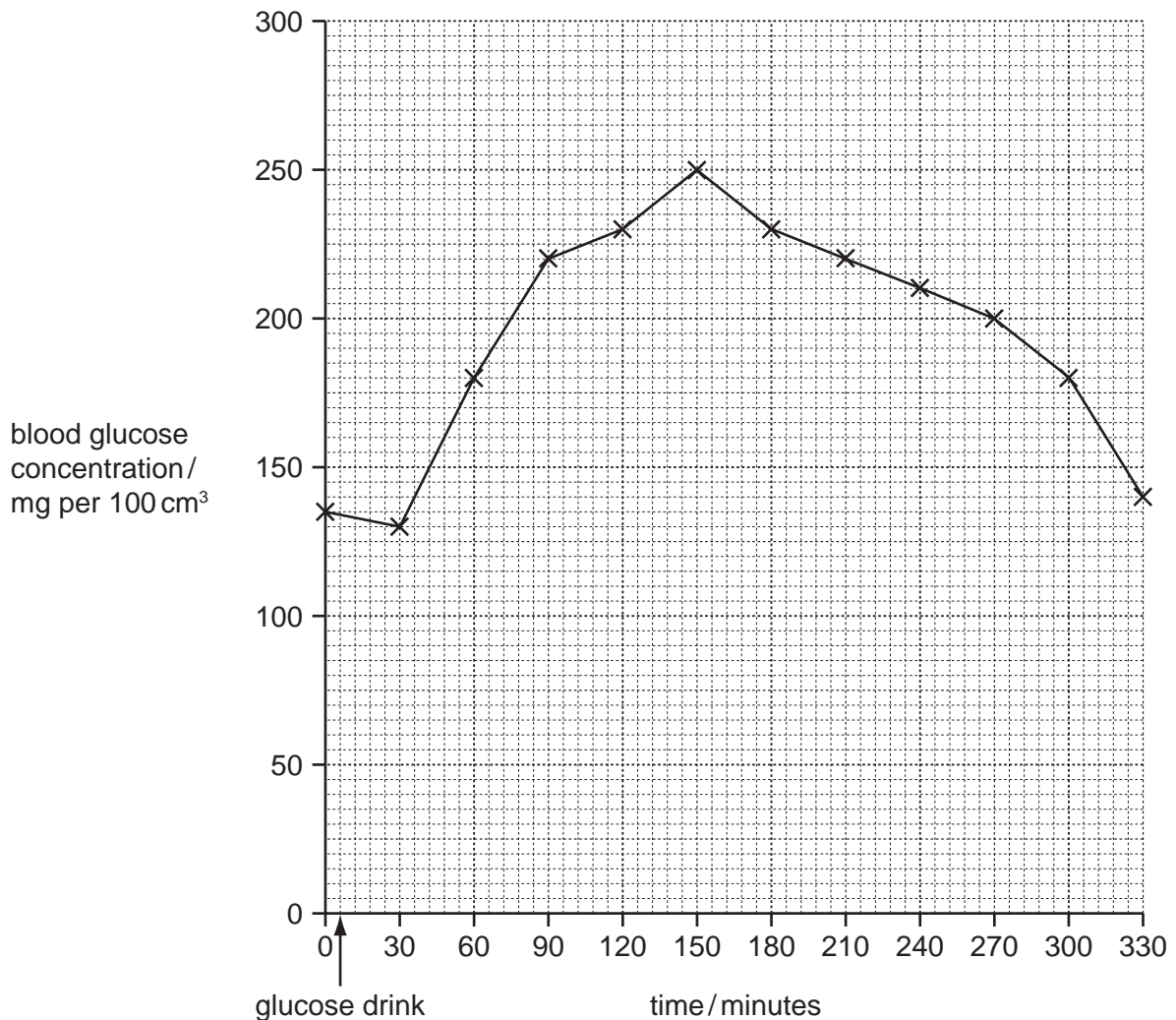


Fig. 2.1

- (i) Draw a horizontal line on Fig. 2.1 to show the **renal threshold**. [1]
- (ii) State the time period when the kidney will produce urine containing glucose. [1]
- [1]
- (iii) Sketch on Fig. 2.1 the blood glucose concentrations that the doctor might expect if he repeated this test on someone who does **not** have diabetes. [1]

- (c) People who do not have diabetes maintain their blood glucose concentration below 180 mg per 100 cm³.

Explain how the body does this.

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..... [3]

[Total: 12]