# GCSE Biology A (Gateway)

**J247/01** B1-B3 and B7 Foundation (Foundation Tier)

## Question Set 22

1 (a) (i) Diabetes occurs when blood sugar levels are not controlled.

Which hormone reduces blood sugar levels? **Insulin**

**[1]**

(ii) Hormones are produced in endocrine glands.

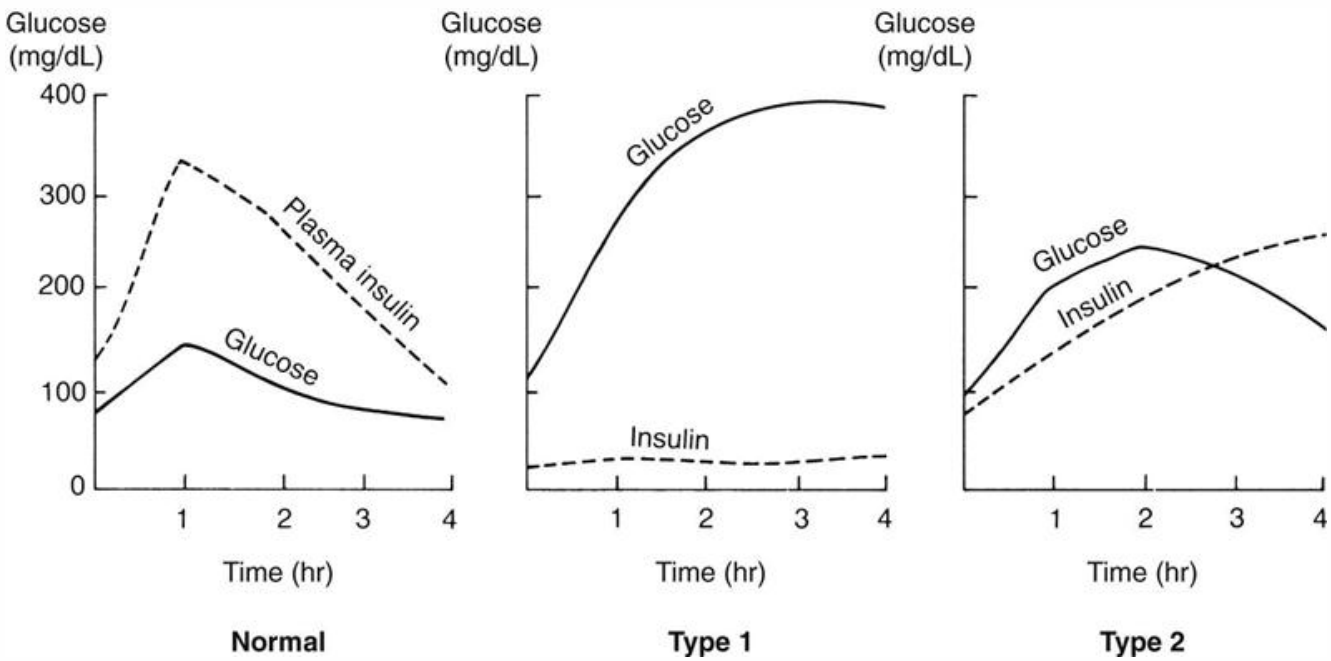
Describe how hormones control different parts of the body.

**[2]**

Hormones are secreted into the bloodstream and travel to different target organs across the body e.g. insulin targets the liver and skeletal muscle whereas oestrogen targets the ovaries and uterus. They bind to specific receptors on target cells or directly enter cells, initiating a variety of changes within the cell.

(iii)* A glucose tolerance test can help identify if a person has diabetes.

The graphs show a glucose tolerance test in three people **A**, **B**, and **C**.



One person is healthy and the other two people have different types of diabetes.

Explain the differences between the three graphs and describe how each person with diabetes could control their blood glucose levels.

Use information from the graphs in your answer. **[6]**

Individual A is the healthy individual. As blood glucose concentration rapidly rises and peaks at 1 hour, so does the concentration of plasma insulin. The pancreas detects a rise in glucose levels so secretes insulin. Insulin causes liver and muscle cells to increase their uptake of glucose, and also makes the liver onvert glucose into glycogen. This causes glucose levels to decrease, returning to normal levels after to 4 hours. As glucose levels decrease, plasma insulin levels fall. Individual B has type 1 diabetes. s glucose levels rise, insulin levels remain low and relatively constant at approximately 20 mg/dL. This is ecause type 1 diabetes results from little to no insulin production by the pancreas. Glucose concentration rises uch more rapidly than in the healthy individual, reaching almost 400 mg/dL after 3 hours. Glucose levels are lso initially more elevated at 0 hours than in the healthy individual. This type of diabetes can be regulated using regular injections of insulin at mealtimes to prevent blood glucose levels rising too quickly after ood digestion. As well as insulin therapy, type 1 diabetes can also be controlled by taking regular exercise nd limiting the intake of simple carbohydrates. Individual C has type 2 diabetes. As glucose levels rise, insulin levels also rise, although less rapidly than in the normal individual. Insulin levels also remain below lucose levels until approximately 2·8 hours. Glucose levels are higher than in healthy individuals, reaching a peak of roughly 250 mg/dL after 2 hours. This is because the pancreas doesn't produce enough insulin or the body's cells become resistant to insulin, so blood glucose levels remain elevated. lype 2 diabetes can be controlled by losing weight, reducing the intake of simple carbohydrates and getting regular exercise. Some medications can also be used to increase the effectiveness of insulin in the body.

**(b)** Diabetes can often result in high levels of glucose in the urine.

Which organ usually prevents glucose being lost from the blood when urine is made? Kidney **[1]**

**(c)** Drugs can be used to treat one type of diabetes. One drug prevents an enzyme working properly.

Suggest how a drug can stop an enzyme working. **[2]**

The drug may possess a similar chemical shape to the enzyme's substrate. It may bind to the active site of the enzyme, blocking it and preventing the substrate binding.

## Total Marks for Question Set 22: 12