

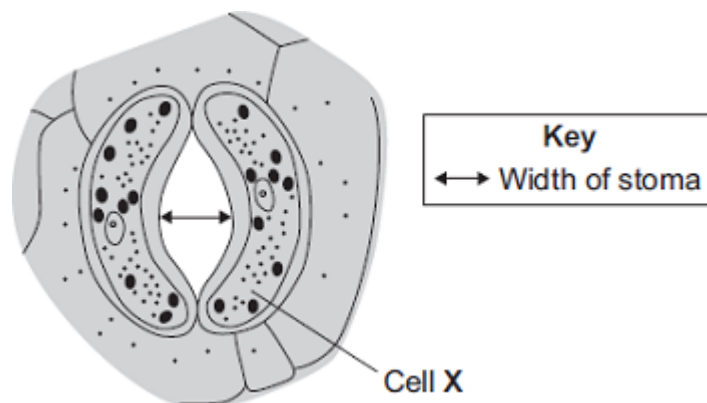
Name of the Student: _____

Max. Marks : 24 Marks

Time : 24 Minutes

Q1.

Plant leaves have many stomata.
The diagram shows a stoma.



(a) Name cell X _____

(1)

- (b) The table shows the mean widths of the stomata at different times of the day for two different species of plant.
Species **A** grows in hot, dry deserts.
Species **B** grows in the UK.

	Time of day in hours	Mean width of stomata as a percentage of their maximum width	
		Species A	Species B
Dark	0	95	5
	2	86	5
	4	52	6
Light	6	6	40
	8	4	92
	10	2	98
	12	1	100
	14	0	100

	16	1	96
	18	5	54
Dark	20	86	6
	22	93	5
	24	95	5

The data in the table show that species **A** is better adapted than species **B** to living in hot, dry deserts.

Explain how.

(4)
(Total 5 marks)

Q2.

The number of cases of Type 2 diabetes in the UK is increasing rapidly.

- (a) Describe how insulin and glucagon help control the blood sugar concentration in a healthy person.

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(6)

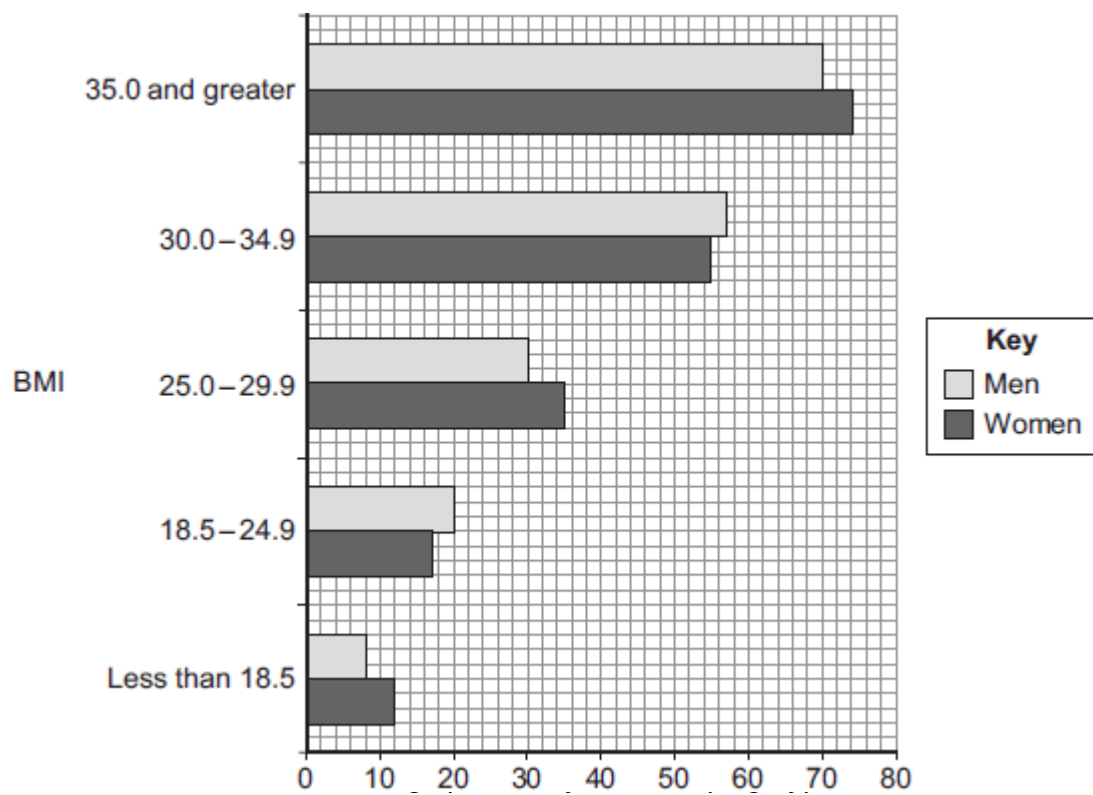
- (b) What is Type 2 diabetes?

(1)

- (c) Body mass index (BMI) is a person's body weight divided by the square of his or her height.

- (i) **Graph 1** shows the relationship between BMI and the percentage probability of developing Type 2 diabetes.

Graph 1

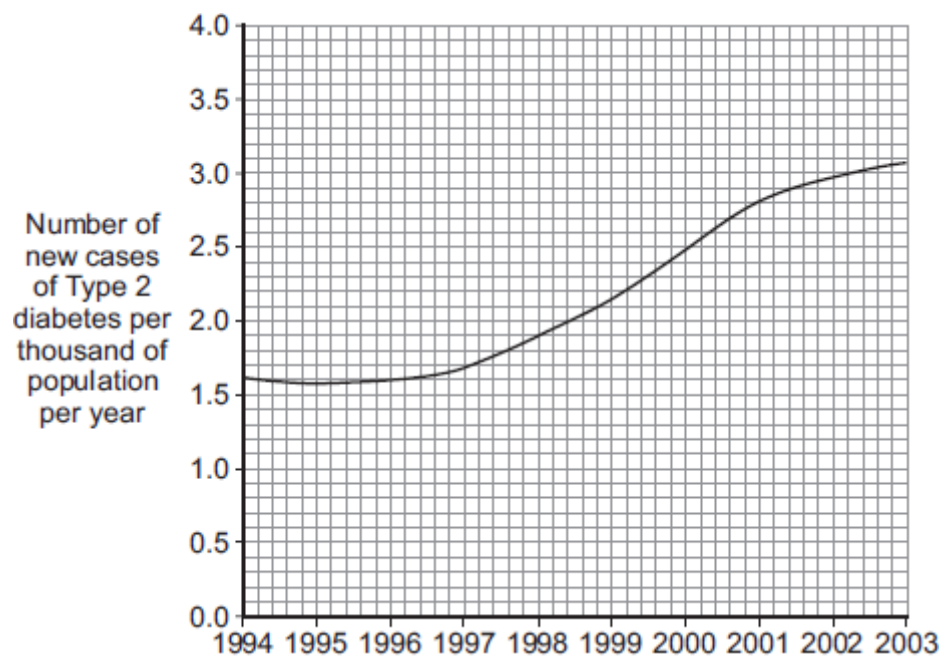


Suggest an explanation for the relationship between BMI and the risk of developing Type 2 diabetes.

(2)

- (ii) **Graph 2** shows changes in the number of new cases of Type 2 diabetes in the UK.

Graph 2



Suggest explanations for the trend shown by the data in **Graph 2**.

(3)

(Total 12 marks)

Q3.

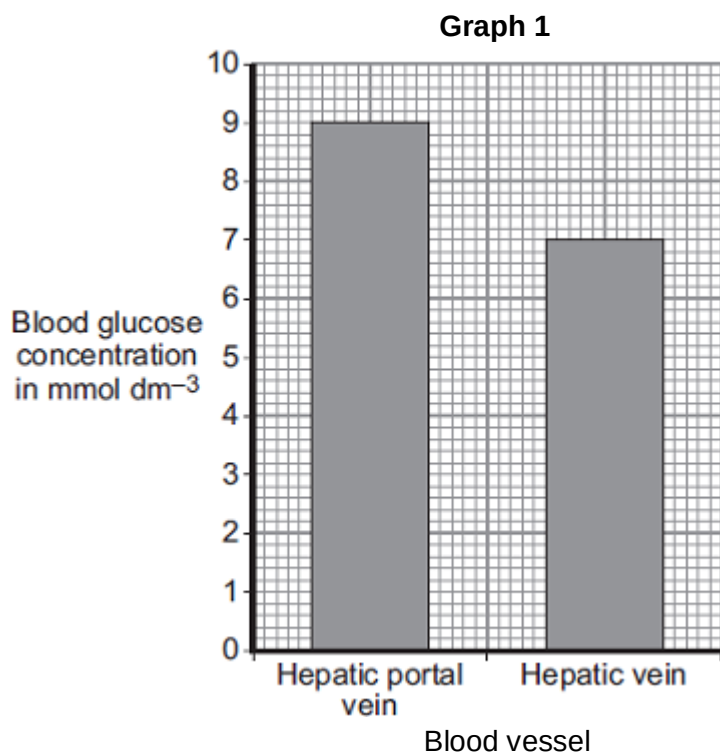
The pancreas and the liver are both involved in the control of the concentration of glucose in the blood.

The liver has two veins:

- the hepatic portal vein taking blood from the small intestine to the liver
- the hepatic vein taking blood from the liver back towards the heart.

Scientists measured the concentration of glucose in samples of blood taken from the hepatic portal vein and the hepatic vein. The samples were taken 1 hour and 6 hours after a meal.

Graph 1 shows the concentration of glucose in the two blood vessels 1 hour after the meal.

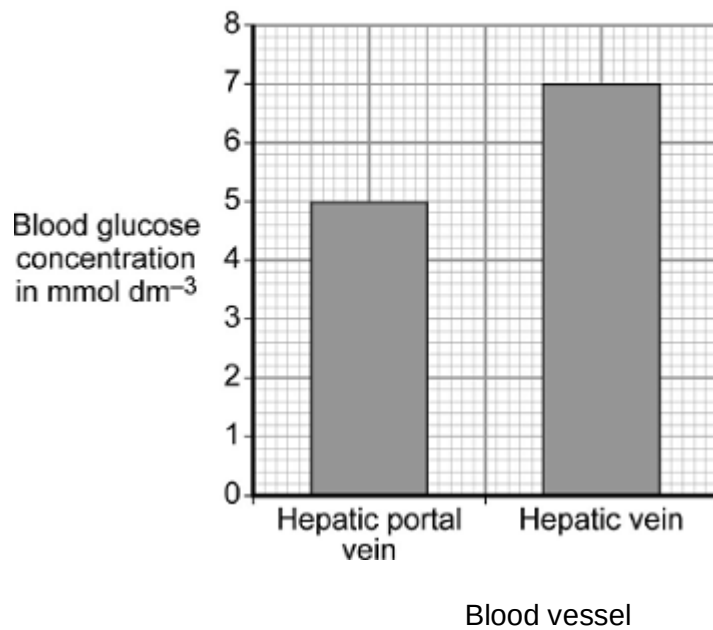


- (a) The concentration of glucose in the blood of the two vessels is different. Explain why.

(3)

- (b) **Graph 2** shows the concentration of glucose in the two blood vessels 6 hours after the meal.

Graph 2



- (i) The concentration of glucose in the blood in the hepatic portal vein 1 hour after the meal is different from the concentration after 6 hours.

Why?

(1)

- (ii) The person does **not** eat any more food during the next 6 hours after the meal.

However, 6 hours after the meal, the concentration of glucose in the blood in the hepatic vein is higher than the concentration of glucose in the blood in the hepatic portal vein.

Explain why.

(3)

(Total 7 marks)