

REVISION (5)

GRADE 8

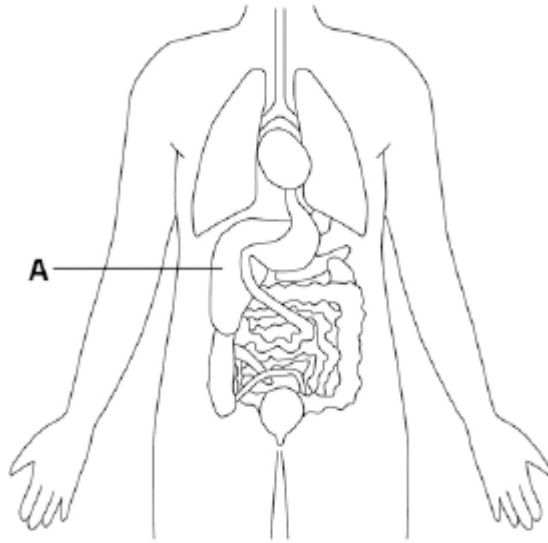
CHAPTER

HOMEOSTASIS

(PAPER 3)

Q1.Humans control their internal environment in many ways.

Look at the diagram below.



(a) Name organ **A**.

ANS)

liver

(b) Organ **A** stores glucose.

People with Type 1 diabetes cannot effectively control the levels of glucose in their blood.

Name the **hormone** people with **Type 1 diabetes** have to inject to decrease their blood glucose level.

ANS)

insulin

(c) Which organ produces urine?

Tick **one** box.

Brain

Kidney

Lungs

Thyroid

ANS).

kidney

(d) Marathon runners often drink sports drinks during a race.

Explain why.

ANS)

to replace water / ions / salt

(that is) lost in sweat

Q2) Type 1 diabetes develops when the body does not produce enough insulin.

(a) Which organ produces insulin.

ANS) Pancreas

(b) One treatment for diabetes is to inject insulin. The table gives the properties of four different types of insulin, A, B, C and D.

| Type of insulin | Time taken for the insulin to begin to work in minutes | Time taken for insulin to reach maximum concentration in the blood in minutes | Time when insulin is no longer effective in hours |
|-----------------|--|---|---|
| A | 15-20 | 30-90 | 3-4 |
| B | 30-60 | 80-120 | 4-6 |
| C | 120-240 | 360-600 | 14-16 |
| D | 240-360 | 600-960 | 18-20 |

(i) Some people with diabetes need to inject insulin just before a meal to stop a big increase in blood sugar concentration. Which type of insulin, A, B, C or D, should these people with diabetes inject just before a meal?

ANS) TYPE (A)

Give the reason for your answer.

ANS) Shortest / quicker time (to work).

(ii) A person with diabetes is told to inject type B insulin immediately after breakfast at 09.00.

The person with diabetes is told to then inject a second type of insulin at lunchtime at 12.00.

The second type of insulin should keep the blood sugar level under control for the rest of the 24 hours.

Which type of insulin, A, C or D, should this person with diabetes inject at lunchtime?

ANS) TYPE (D)

Give the reason for your answer.

ANS) Acts for longest time because D will last until 09.00 / breakfast / 24 hours.

(iii) Apart from injecting insulin, give one other way in which Type 1 diabetes can be controlled.

ANS)

1) Diet and exercise, e.g. 'less carbohydrate or sugar'

2) Accept pancreas transplant / stem cell treatment.

Q3) The human body is kept at a constant internal temperature of about 37 °C.

Body temperature is monitored and controlled by the thermoregulatory centre in the brain.

Describe what happens in the body to keep the body temperature constant.

ANS) Thermoregulatory center: in the hypothalamus, it controls the use of corrective mechanisms (e.g. sweating and shivering).

Sweating: The water evaporates giving a cooling effect.

Skin receptors: Sense heat and sensory neurons send impulses to the hypothalamus

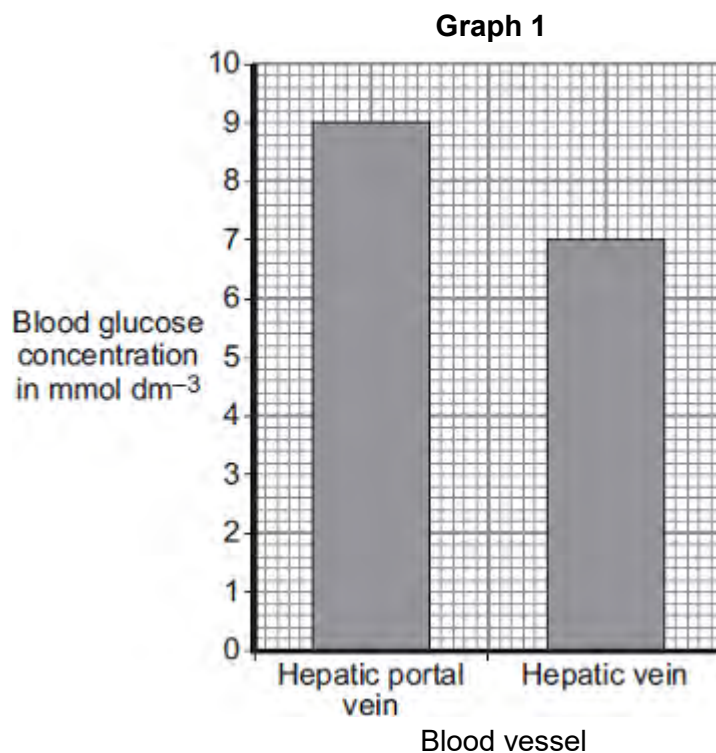
• Shivering: Muscular activity generates heat.

Q4) 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.



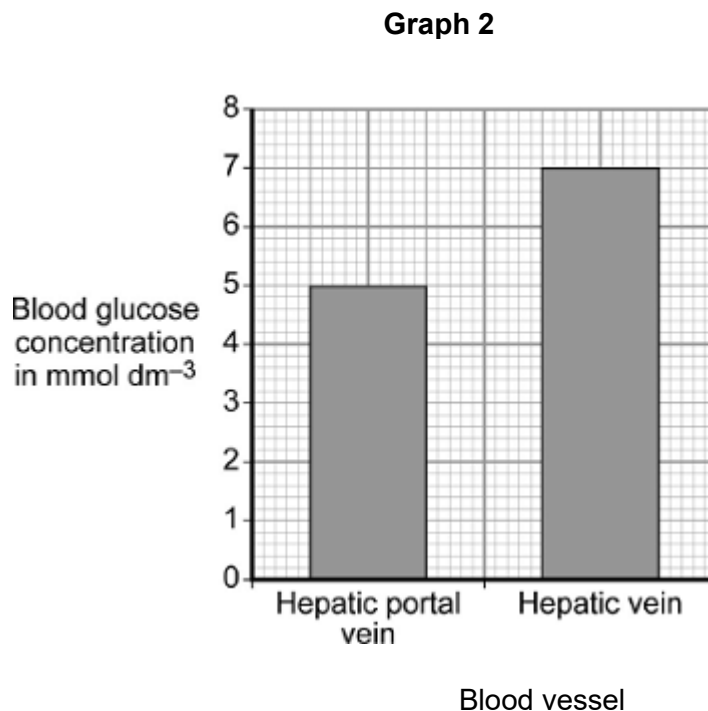
- (a) The concentration of glucose in the blood of the two vessels is different. Explain why.

ANS)

1) (Concentration high) in the hepatic portal vein because blood with glucose absorbed from the intestine.

2) Concentration is lower in the hepatic vein because insulin has converted glucose into glycogen.

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



- (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?

ANS) (After 6 hours) most of the glucose has been absorbed from the intestine or from food into the blood.

(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.

ANS) After 6 hours most of the glucose has been absorbed from the intestine into the blood because glucagon (made in the pancreas) causes glycogen to be converted into glucose.

Glucose released into blood which allow the liver maintains the constant level of glucose in the blood.

Q5) One group of scientists is working in a hot desert and another group is working in a tropical rainforest.

The table shows information about the scientists and the conditions in the desert and the rainforest.

| Information | Hot desert | Rainforest |
|--|------------|------------|
| Mean core body temperature of scientists in °C | 37.3 | 38.9 |
| Air temperature in °C | 36.0 | 35.5 |
| Mean percentage concentration of moisture in the air | 9.0 | 92.0 |
| Mean wind speed at ground level in metres per second | 12.0 | 3.0 |

(a) Both groups of scientists are doing similar jobs. The jobs cause the scientists to sweat a lot.

Use information from the table to explain the difference in the mean core body temperature of the two groups of scientists.

ANS) IN RAINFOREST :

1)Sweat does not evaporate (as much). Due to less wind / higher moisture / humidity.

2) Less cooling effect.

IN DESERT:

1)Sweat evaporate (more). Due to high wind / less moisture / humidity

2) More cooling effect.

(b) Changes to blood vessels in the skin help to decrease body temperature. Explain how.

ANS) Vasodilatation: when it is hot, arterioles, which supply blood to the skin surface capillaries, dilate (become wider) to allow more blood near to skin surface to increase heat loss .