

All questions are for both separate science and combined science students

Q1.

Human body temperature is controlled within very narrow limits.

Scientists investigated the effect of drinking ice-cold water on:

- internal body temperature
- the rate of sweating.

This is the method used.

1. Sit a person inside a room kept at a constant temperature of 25 °C.
2. Measure the person's internal body temperature near the brain.
3. Measure the person's rate of sweating.
4. After 20 minutes, give the person 500 cm³ of ice-cold water to drink.
5. Continue to measure the person's internal body temperature and sweating rate for a further 50 minutes.

- (a) Give the reason why the person should **not** move during the investigation.

(1)

Figure 1 and Figure 2 show the scientists' results.

Figure 1

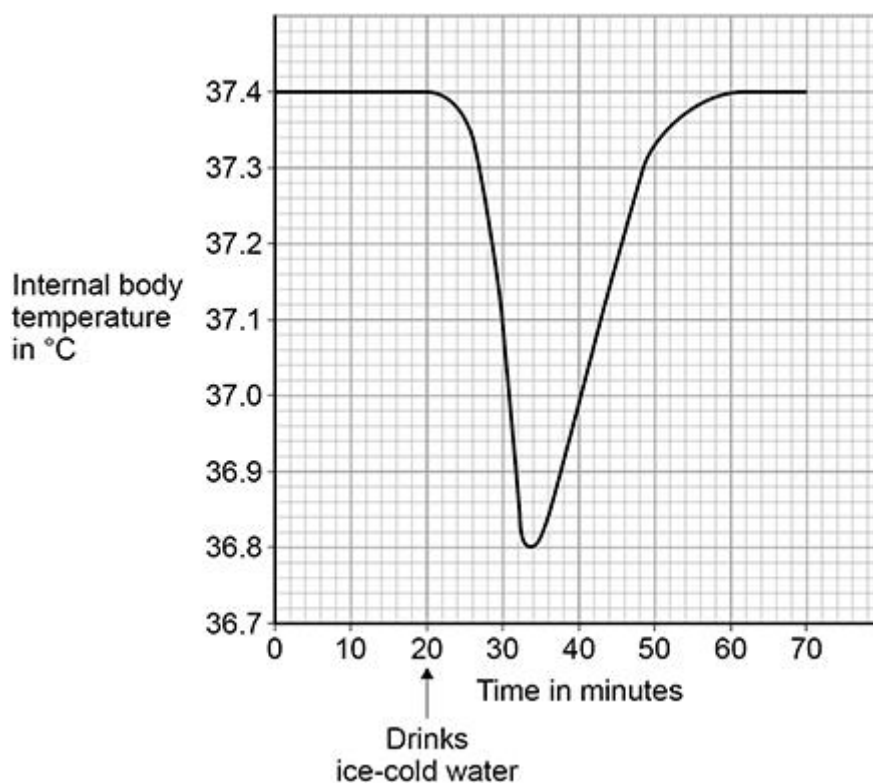
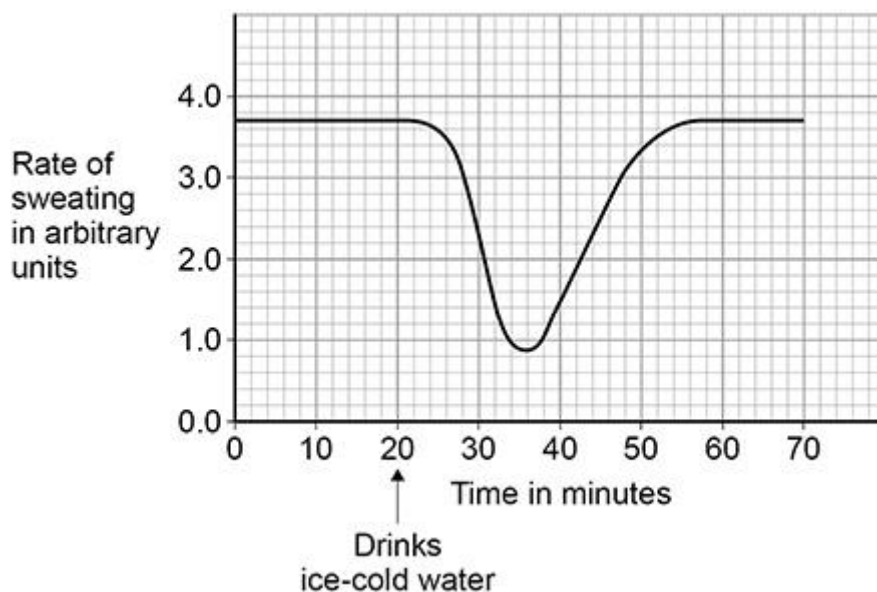


Figure 2



(b) What is this person's normal internal body temperature?

Tick (✓) **one** box.

36.8 °C 37.0 °C 37.4 °C

(1)

The results show that when the ice-cold water was drunk, the temperature near the brain decreased.

(c) Explain why the temperature near the brain decreased.

(2)

(d) The thermoregulatory centre in the brain responds to the decrease in temperature.

How does the thermoregulatory centre send information to sweat glands in the skin?

(1)

- (e) The rate of sweating changes between 24 minutes and 36 minutes.

Explain how this change helps to maintain the person's normal body temperature.

(2)

- (f) During exercise, the skin appears red.

What causes the skin to appear red?

Tick (✓) **one** box.

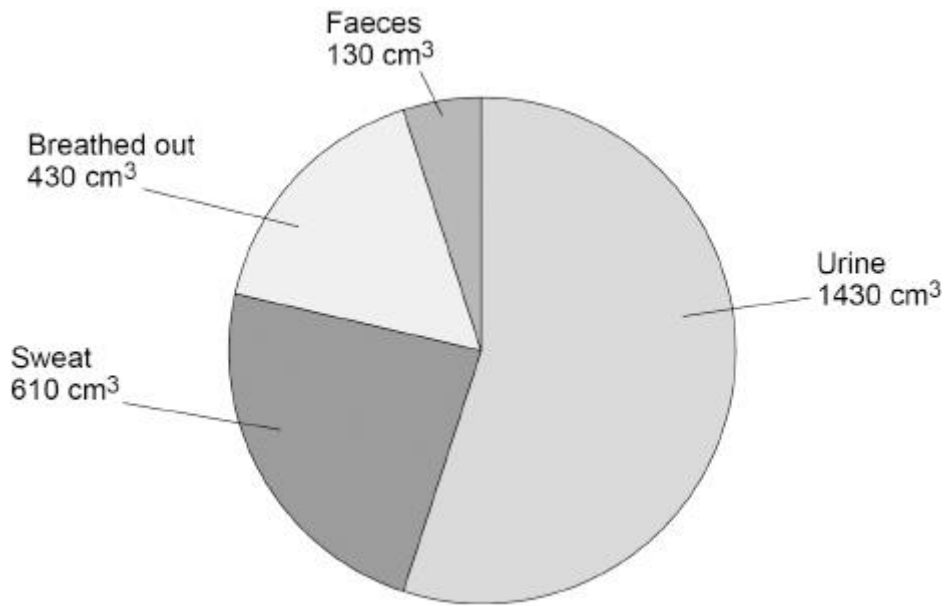
- | | |
|---|--------------------------|
| Blood vessels moving closer to the skin surface | <input type="checkbox"/> |
| Constriction of blood vessels in the skin | <input type="checkbox"/> |
| Decrease in heart rate | <input type="checkbox"/> |
| Dilation of blood vessels in the skin | <input type="checkbox"/> |

(1)

(Total 8 marks)

Q2.

The pie chart below shows the water loss from a person on one day.



(a) The total water loss was 2600 cm³.

Calculate the percentage of the total water loss that was lost as urine.

Percentage lost as urine = _____ %

(2)

A marathon race is 42 km long.

(b) What happens to the volume of water lost as sweat when a person runs a marathon?

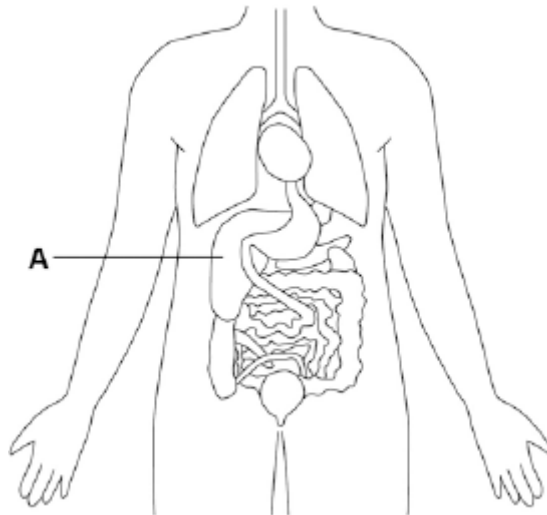
(1)

(c) What must marathon runners do to prevent themselves becoming dehydrated?

(1)

(d) Complete the sentences.

Choose answers from the box.



- (a) Name organ **A**.

(1)

- (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.

(1)

- (c) Which organ produces urine?

Tick **one** box.

Brain

Lungs

Kidney

Thyroid

(1)

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

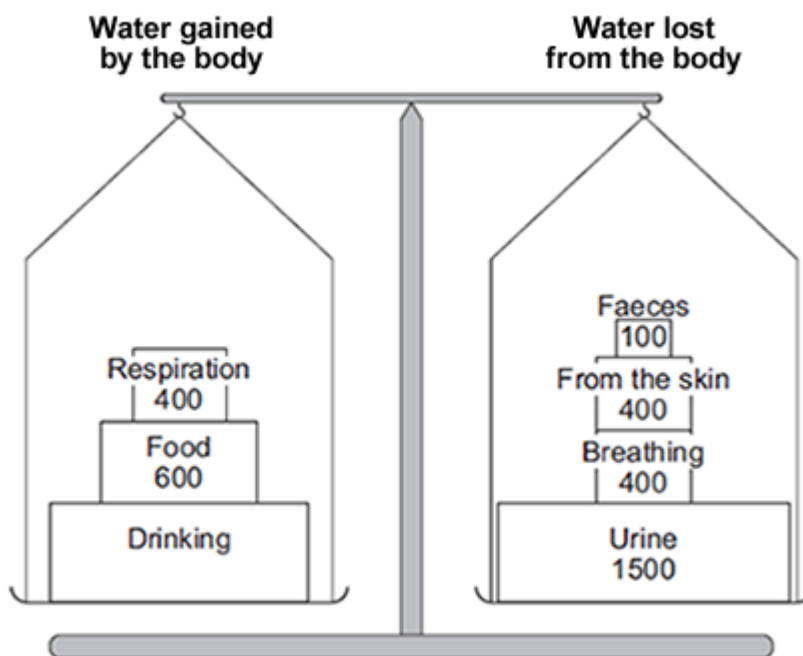
Explain why.

(2)
(Total 5 marks)

Q4.

The diagram below shows the water balance for a person on a cold day.

The numbers show the volume of water, in cm³, the person's body gained and lost.



- (a) (i) How much water was lost from the body on the cold day?

Draw a ring around the correct answer.

1800 cm³ 2400 cm³ 3300 cm³

(1)

- (ii) The volume of water gained by the body should balance the volume of water lost from the body.

How much water should the person have drunk to keep the balance?

Volume of water = _____ cm³ (2)

(b) (i) Name the process by which water is lost from the skin.
 _____ (1)

(ii) Why does the body need to lose water from the skin?

 _____ (1)

(c) The next day was a hot day. The person gained the same volume of water and did the same activities.

(i) What effect did the increase in temperature have on the volume of water the person lost?

Tick (✓) **one** box.

Less water was lost through the skin.

More water was lost through the skin.

More water was lost in faeces.

(1)

(ii) What effect would the increase in temperature have on the volume of urine the person lost?

Draw a ring around the correct answer.

decrease

increase

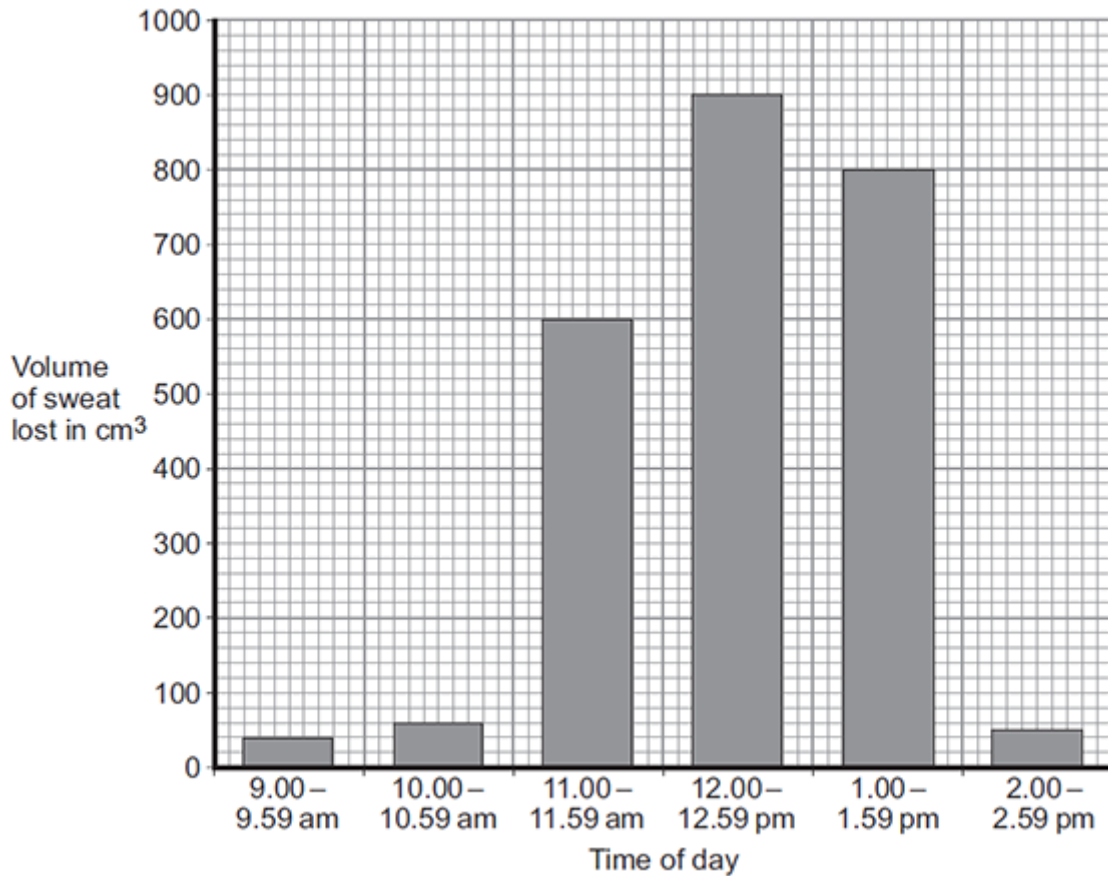
no change

(1)

(Total 7 marks)

Q5.

A scientist measured the volume of sweat lost between 9.00 am and 2.59 pm in one day by one person. The graph below shows the results.



(a) (i) Suggest what happened at 11.00 am.

Tick (✓) **one** box.

The person moved into a cold room.

The person removed their coat.

The person started running a race.

(1)

(ii) Calculate the total volume of sweat lost between 11.00 am and 1.59 pm.

Total volume of sweat lost = _____ cm³

(1)

(iii) Suggest **one** way the person could replace the water that was lost as

sweat.

(1)

- (b) (i) Sweating helps keep our internal body temperature within a narrow range.

Which organ monitors body temperature?

Tick (✓) **one** box.

brain

kidney

pancreas

(1)

- (ii) The organ that monitors internal body temperature receives information about temperature from the skin.

Which structures in the skin send impulses with this information?

Tick (✓) **one** box.

capillaries

glands

receptors

(1)

- (c) How does sweating help to control body temperature?

(1)

(Total 6 marks)

Q6.

Humans keep their internal conditions almost constant.

