

(Homeostasis (definition, control systems))

Q1.a)(2021)

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.

Give the reason why the person should **not** move during the investigation.

[1 mark]

Q1.b)(2021)

Figure 17 and Figure 18 show the scientists' results.

Figure 17

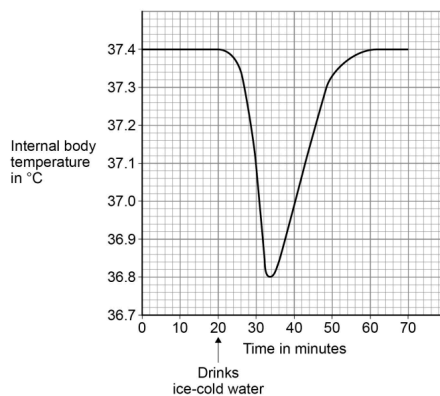
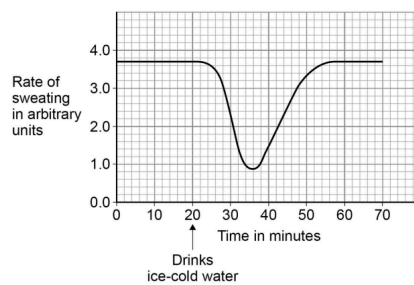


Figure 18



What is this person's normal internal body temperature?

[1 mark]

Tick (✓) **one** box.

36.8 °C

☐

37.0 °C

☐

37.4 °C

☐

Q1.c)(2021)

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

Explain why the temperature near the brain decreased.

[2 marks]

Q1.d)(2021)

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 mark]

Q1.e)(2021)

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 marks]

Q1.f)(2021)

Homeostasis and Response

<http://www.pcfgstudy.com>

During exercise, the skin appears red.

What causes the skin to appear red?

[1 mark]

Tick (✓) **one** box.

Blood vessels moving closer to the skin surface

☐

Constriction of blood vessels in the skin

☐

Decrease in heart rate

☐

Dilation of blood vessels in the skin

☐

Q2.a)(2022)

The control of body temperature is important in the human body.

An athlete trained in a hot climate.

On one day, the athlete lost 3 200 cm³ of water in sweat.

Evaporation of 1 cm³ of sweat requires 2.5 kJ of energy.

Calculate the energy the athlete used for evaporation of sweat.

[2 marks]

Energy = _____ kJ

Q2.b)(2022)

On a different day the athlete used 6 000 kJ of energy to evaporate sweat.

The athlete's energy intake was 24 000 kJ.

Calculate the percentage of the athlete's energy intake used for evaporation of sweat.

[2 marks]

Percentage = _____ %

Q2.c)(2022)

Some days the athlete did **not** do any training and rested at home.

What effect would resting have on the volume of sweat produced each day?

[1 mark]
