

Control of body temperature

4.5.2.4 · Homeostasis and response · revision notes

How the thermoregulatory centre in the brain keeps your body temperature close to 37 °C, using sweating, changes in blood flow to the skin and shivering. Expect 'describe' and 'explain' questions, often in a context such as exercise or a cold day. This subtopic is in GCSE Biology only.

Key facts

- Thermoregulatory centre (in the brain): receptors sensitive to blood temperature
- Too hot: vasodilation + more sweating
- Vasodilation: more blood near the skin surface → more energy transferred to the environment
- Skin temperature receptors send nervous impulses to the thermoregulatory centre
- Too cold: vasoconstriction + sweating stops + shivering
- Sweat evaporating transfers energy away from the skin

Notes

Monitoring temperature

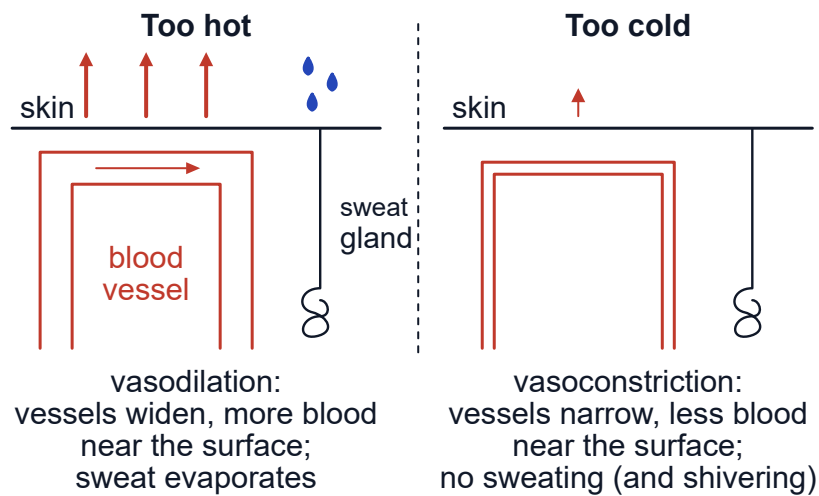
- Body temperature is monitored and controlled by the **thermoregulatory centre** in the **brain**.
- The thermoregulatory centre contains **receptors sensitive to the temperature of the blood**.
- The **skin** also contains **temperature receptors**, which send **nervous impulses** to the thermoregulatory centre.
- Keeping the core temperature near 37 °C keeps enzymes working at their optimum.

If you are too hot

- **Vasodilation**: blood vessels supplying the skin **dilate** (widen), so more blood flows through the capillaries near the skin surface.
- **Sweating**: sweat glands produce more sweat. The water in sweat **evaporates** from the skin.
- Both mechanisms transfer more **energy from the skin to the environment**, so body temperature falls.

If you are too cold

- **Vasoconstriction:** blood vessels supplying the skin **constrict** (narrow), so less blood flows near the skin surface and less energy is transferred to the environment.
- **Sweating stops**, so no energy is transferred away by evaporating sweat.
- **Shivering:** skeletal muscles contract rapidly.



Red arrows: energy transferred from the skin to the surroundings. More when hot, less when cold.

How to answer each type of question

Describe the body's responses

2 to 3 marks

Grade 5

1. Decide whether the body is too hot or too cold.
2. Give one response per mark, using the correct terms (vasodilation, vasoconstriction, sweating, shivering).

Example. Describe how the body responds when its temperature falls below normal.

Model answer. Blood vessels supplying the skin constrict / vasoconstriction (1). Sweating stops (1). Skeletal muscles contract rapidly / shivering (1).

Don't lose marks

- ✗ Saying blood vessels move closer to or further from the skin. They stay where they are; they widen or narrow.
- ✗ Saying capillaries dilate or constrict. It is the blood vessels supplying the capillaries that change width.
- ✗ Writing that sweating cools you without saying the sweat evaporates, transferring energy from the skin.
- ✗ Saying shivering 'makes heat' without linking it to respiration in the muscles.
- ✗ Forgetting to name the thermoregulatory centre or saying it is in the skin. It is in the brain.

More tips

Memory tricks

- Too hot: 'dilate and sweat'. Too cold: 'constrict and shiver'.
- Vasodilation = red face when hot; vasoconstriction = pale skin when cold.
- Sweat only cools you when it evaporates.
- Shivering warms you because contracting muscles respire.

Exam technique

- Always link a response to energy transfer: 'so more (or less) energy is transferred from the skin to the environment'.
- In a context question, use the details given (red skin, sweat, shivering) and explain each one.
- For 6-mark answers, cover detection as well as the responses, and keep them in a logical order.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3

State normal core body temperature

About 37 °C, the optimum for the body's enzymes.

Grade 4

Name where temperature is monitored

The thermoregulatory centre in the brain, which has receptors sensitive to blood temperature.

Grade 4

List the responses to overheating

Vasodilation and more sweat produced by sweat glands.

Grade 5

List the responses to being too cold

Vasoconstriction, sweating stops, and skeletal muscles contract (shivering).

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