Temperature Control in Ectotherms and Endotherms

Grade: 12
Subject: Biology

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Objective: By the end of the lesson, students will understand the behavioral and physical mechanisms used by ectotherms and endotherms to regulate body temperature.

What happens to your body when you feel too hot or too cold?

Hot:

Sweating, seeking shade, drinking water.

Cold:

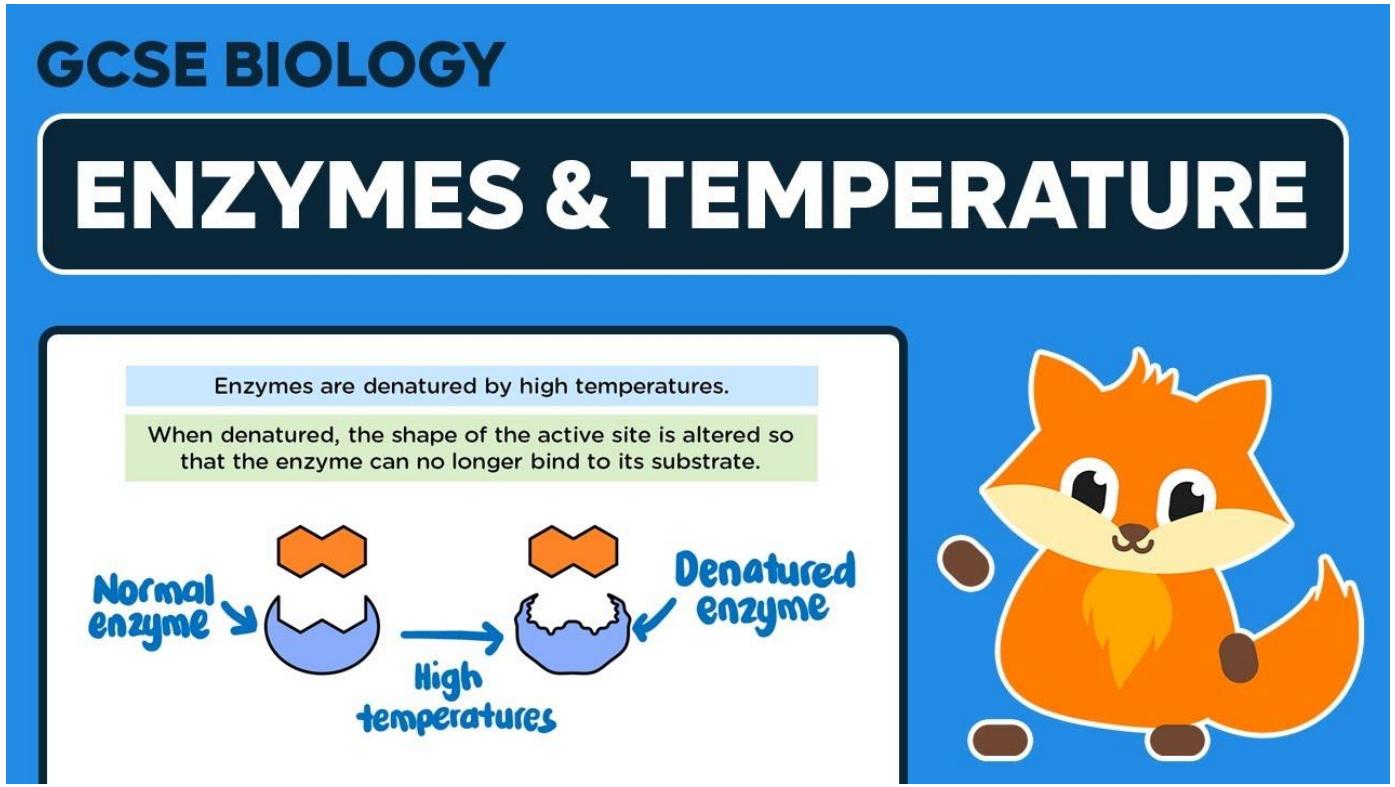
Shivering, bundling up, reduced activity.

Importance of Temperature Control

Enzymes function ***optimally*** *within a narrow temperature range.*

Extreme heat denatures enzymes; extreme cold slows metabolic reactions.

Consequences of failure: Organ dysfunction, hypothermia, hyperthermia.



Temperature Control in Ectotherms

Ectotherms depend on external heat sources to regulate their body temperature.

Behavioral Responses:

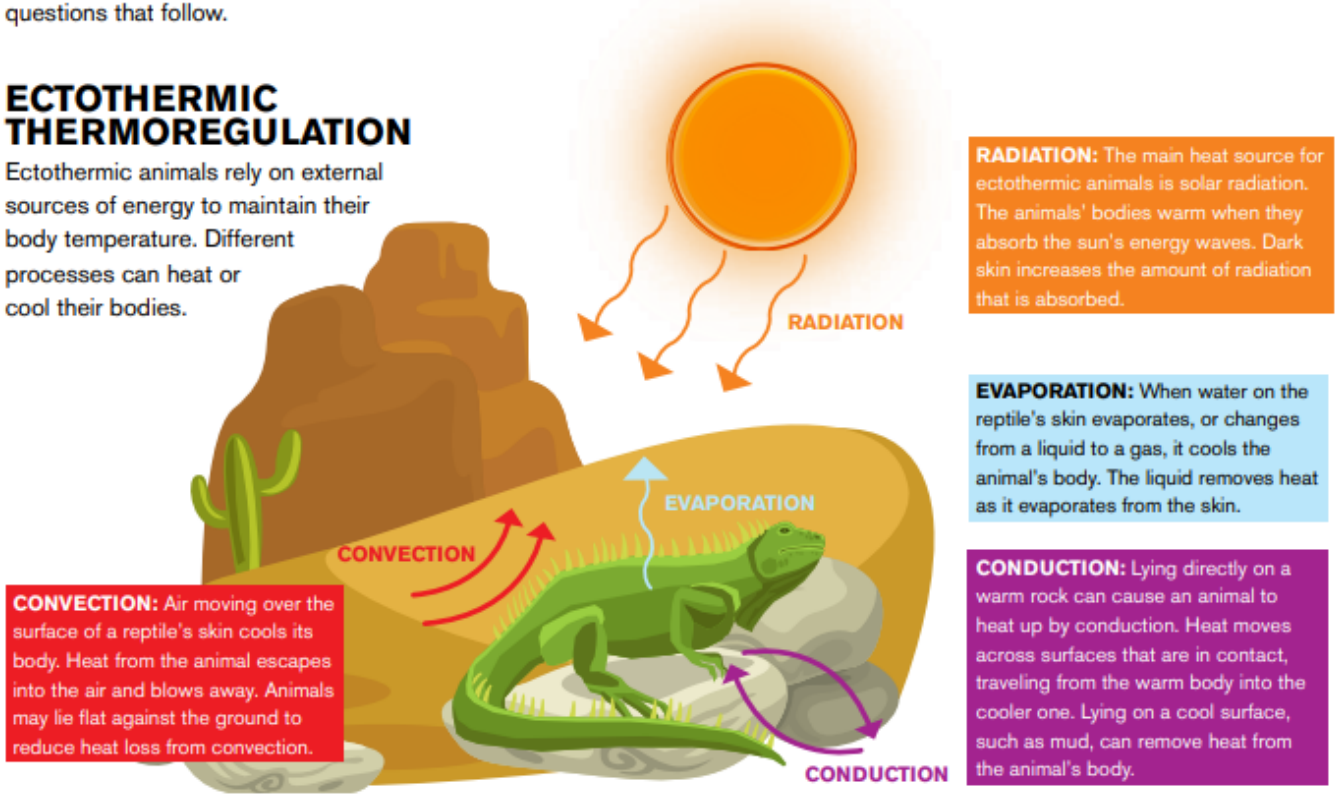
Basking in the sun (e.g., lizards warming up on rocks in the morning).

Seeking shade or burrowing to avoid overheating (e.g., snakes hiding under rocks during hot hours).

Adjusting body position to maximize or minimize heat absorption (e.g., butterflies spreading wings to absorb heat).

Examples of Ectotherms: *Reptiles, amphibians, fish, and insects.*

Like all reptiles, these crocs are *ectothermic*. Their body temperature is controlled by their environment. Humans and other mammals, on the other hand, produce heat inside their bodies to maintain a specific body temperature. The diagram below shows some of the ways ectothermic animals can regulate their body temperature. Use the diagram to answer the questions that follow.



Temperature Control in Endotherms

Endotherms regulate their body temperature through internal mechanisms.

Behavioral Responses:

Seeking shade or water (e.g., elephants bathing in water to cool down).

Curling up or huddling together to conserve heat (e.g., penguins in the cold).

Temperature Control in Endotherms

Physical Responses:

Vasodilation: Blood vessels widen to release heat (e.g., humans sweating in hot conditions).

Vasoconstriction: Blood vessels narrow to retain heat (e.g., shivering when cold).

Metabolic heat production: Increasing metabolic rate to generate heat (e.g., brown fat metabolism in babies).

Examples of Endotherms: *Mammals and birds.*