Skin Under Pressure

Trace how skin works with other systems during heat and injury

HAP.2 "Obtain, evaluate, and communicate information to describe how the structures of the integumentary system and its accessory organs contribute to its function. a..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline skin structures, circle other organs or systems, and number two places where the passage explains how they work together to protect or regulate the body.

A Hot Day on the Court

1. On a hot afternoon, a student runs across a sunlit basketball court. The skin is not just a covering: its outer epidermis forms a barrier that limits water loss and keeps many microbes out. Cells in the epidermis produce melanin, which absorbs some ultraviolet radiation but does not block it all. Beneath it, the dermis holds blood vessels, nerve endings, and sweat glands. Oil from glands near hair follicles helps keep the surface from drying out. Fingernails protect the tips of fingers, while hair helps detect light touch when it moves.

2. As the runner heats up, temperature sensors in the skin and body send signals through the nervous system to the brain. The hypothalamus coordinates responses that help keep internal temperature in a safe range. Blood vessels in the dermis widen, bringing more warm blood near the surface, where heat can escape. Sweat glands release fluid onto the skin; when the sweat evaporates, it carries heat away. These responses link skin to the circulatory and nervous systems. However, sweating also uses body water. If the runner drinks little, the kidneys conserve water by making less urine, although this cannot replace water already lost.

3. During the game, the runner scrapes a knee on the court. The broken epidermis no longer forms a complete barrier at that spot. Platelets in the blood help form a clot that slows bleeding, and immune cells attack microbes that enter the wound. Cells at the edges of the injury later divide to rebuild the epidermis. Nerve endings in the dermis signal pain, which can prompt the runner to stop touching the injured area. These connections show that skin, blood, nerves, and immune defenses work together: protecting the body depends on both an intact surface and responses when that surface is damaged.

2 ANSWER WITH EVIDENCE

Use the passage

1. How does the epidermis help the body maintain water balance and defend against microbes?

2. Trace how a rise in body temperature leads to more heat escaping through the skin. Include the nervous and circulatory systems.

3. Why might the kidneys make less urine while the runner is sweating? Explain how these responses affect different internal conditions.

4. After the scrape, how do the skin, blood, and immune system work together to limit harm?

3 YOUR TURN

Your own words

A soccer player finishes a hot game with a small scrape and has had little water to drink. Write one paragraph explaining how at least three skin structures work with two other organ systems to protect the player and regulate internal conditions. Include one limitation or trade-off.

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PART 1 · READ AND MARK

Underline skin structures, circle other organs or systems, and number two places where the passage explains how they work together to protect or regulate the body. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How does the epidermis help the body maintain water balance and defend against microbes?	**The epidermis limits water loss and forms a barrier that keeps many microbes out.**
2	Trace how a rise in body temperature leads to more heat escaping through the skin. Include the nervous and circulatory systems.	**Temperature signals travel through the nervous system to the brain. The hypothalamus coordinates a response in which dermal blood vessels widen, bringing warm blood near the surface so heat can escape.**
3	Why might the kidneys make less urine while the runner is sweating? Explain how these responses affect different internal conditions.	**Sweat evaporation cools the runner but uses body water. The kidneys make less urine to conserve water, though they cannot replace water already lost.**
4	After the scrape, how do the skin, blood, and immune system work together to limit harm?	**The broken epidermis leaves an opening. Platelets help form a clot that slows bleeding, while immune cells attack microbes that enter the wound.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Sweat glands release fluid that cools the player when it evaporates, while blood vessels in the dermis widen so more heat can escape. The nervous system helps coordinate these responses to rising body temperature. Because sweating uses water, the kidneys may conserve water by making less urine, but they cannot replace what the player has lost. At the scrape, the epidermis cannot keep all microbes out. Platelets help stop the bleeding, and immune cells attack microbes that enter.

Accept explanations that accurately connect a skin structure to another system and state the resulting effect on temperature, water balance, or protection. For Part 3, the limitation may be water lost through sweating or reduced protection where the epidermis is broken.