Skin in Action

How body systems work together to maintain stable conditions

HAP.2.a "Construct an explanation of the relationships between the integumentary system and other organ systems, including the body's mechanisms for maintaining homeostasis."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Circle each organ system named in the passage. Underline the changes in or near the skin that help keep the body's internal conditions stable.

A Walk Home

1 At the end of a fast walk home, Maya's face feels hot. Her skin is not just a covering: it works with other systems to keep her internal temperature within a safe range. Temperature sensors in the skin and brain send information through the nervous system to the brain's temperature-control center. When the body is too warm, signals from that center activate sweat glands in the skin. Sweat takes heat from the skin as it evaporates. If sweat cannot evaporate, cooling slows. This response helps prevent body temperature from climbing as Maya keeps moving.

2 Blood vessels beneath Maya's skin also change how much heat escapes. In warmth, the nervous system signals these vessels to widen. The circulatory system then sends more warm blood near the surface, where heat can pass into cooler air. Later, a cold wind makes Maya shiver. Signals from the nervous system narrow the skin's blood vessels, so less warm blood flows close to the surface. Meanwhile, skeletal muscles contract rapidly, producing heat. The skin, blood vessels, and muscles respond together; as body temperature returns toward its usual range, the brain reduces these responses.

3 On her way inside, Maya scrapes her elbow on a rough wall. The skin usually blocks many microbes from entering her body, but the scrape opens that barrier. Platelets in the blood help form a clot that seals the damaged vessels. Immune cells carried in blood move into the injured area and attack microbes that enter. Nearby skin cells divide to replace damaged cells, gradually rebuilding the barrier. A scrape may look red because blood flow increases as part of the local inflammatory response. These linked actions limit blood loss and infection while the skin repairs itself.

2 ANSWER WITH EVIDENCE

Use the passage

1. When Maya gets too warm, how do the nervous system and skin work together to cool her?

2. How does the circulatory system change blood flow near the skin in warmth and in cold? Explain how each change affects heat loss.

3. After Maya scrapes her elbow, how do the skin, blood, and immune cells work together to limit harm?

4. When Maya feels cold wind, how do the skin's blood vessels and skeletal muscles help keep her body temperature stable?

3 YOUR TURN

Your own words

Imagine Maya runs in a warm room while wearing a raincoat that traps damp air against her skin. In 4 to 5 sentences, explain how her skin, nervous system, and circulatory system try to keep her temperature stable and why the coat makes that harder.

ANSWER KEY

Skin in Action

PART 1 · READ AND MARK

Circle each organ system named in the passage. Underline the changes in or near the skin that help keep the body's internal conditions stable. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	When Maya gets too warm, how do the nervous system and skin work together to cool her?	**The nervous system signals sweat glands in the skin to release sweat. As the sweat evaporates, it takes heat from the skin.**
2	How does the circulatory system change blood flow near the skin in warmth and in cold? Explain how each change affects heat loss.	**In warmth, skin blood vessels widen, bringing more warm blood near the surface so heat can escape. In cold, they narrow, reducing blood flow near the surface and limiting heat loss.**
3	After Maya scrapes her elbow, how do the skin, blood, and immune cells work together to limit harm?	**Platelets in the blood form a clot that limits blood loss. Immune cells carried in blood attack microbes, while skin cells replace damaged cells to rebuild the barrier.**
4	When Maya feels cold wind, how do the skin's blood vessels and skeletal muscles help keep her body temperature stable?	**Skin blood vessels narrow to reduce heat loss, while skeletal muscles shiver to produce heat.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

As Maya warms up, her nervous system signals sweat glands in her skin to release sweat. It also signals blood vessels near her skin to widen, so the circulatory system carries more heat toward the surface. Sweat cools her when it evaporates, and heat can pass from her skin into cooler air. The raincoat traps damp air and blocks some heat transfer, so these responses may not cool her enough.

Accept explanations that correctly link a system's action to heat loss, heat production, reduced blood loss, or protection from microbes. For Part 3, students should explain both cooling responses and a way the raincoat interferes with cooling.