Kidneys on Call

Trace how kidney responses help keep internal conditions stable.

HAP.11.a "Construct an explanation of how the excretory system maintains homeostasis, including blood pressure and pH."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each change that could disturb blood pressure or pH, then circle the kidney response to it. Give each change and its matching response the same number to show the connection.

A Practice Day Inside the Body

(1) After a long soccer practice on a hot afternoon, Maya has lost water in sweat. Less water in her bloodstream can lower blood volume and blood pressure. Her kidneys, part of the excretory system, filter her blood and adjust what leaves as urine. When blood pressure drops, kidney cells release renin, starting a chain of signals that raises aldosterone. This hormone tells the kidneys to return more sodium to the blood. Water follows sodium, so less water leaves in urine. As Maya drinks, this water retention helps restore blood volume and supports blood pressure.

(2) Later, Maya drinks plenty of water with a salty dinner. If her blood volume rises, her blood pressure may rise too. In response to higher pressure, the kidneys can let more sodium and water leave in urine. Losing this extra fluid helps bring blood volume and pressure back toward their usual range. The kidneys do not simply switch urine on or off. They continually adjust how much water and sodium the body keeps, while hormones and blood flow help guide those adjustments. The result is a moving balance rather than one fixed amount of urine.

(3) Practice also changes the chemistry of Maya's blood. Working muscles produce extra acids, which can push blood pH downward. The kidneys help prevent a lasting drop in pH by releasing hydrogen ions (H^+) into urine and returning bicarbonate (HCO_3^-) to the blood. Bicarbonate helps buffer acids in the blood. The lungs remove carbon dioxide quickly, while kidney adjustments take longer and help maintain balance over time. Both pressure control and pH control depend on kidneys changing what they keep and what they excrete. That is how an excretory organ helps keep internal conditions stable even as activity and meals change.

2 ANSWER WITH EVIDENCE

Use the passage

1. How does losing water in sweat lead to a kidney response that supports Maya's blood pressure? Trace the steps from the change in blood volume to the change in urine.

2. If Maya's blood volume rises after dinner, how can her kidneys help bring her blood pressure back toward its usual range?

3. How do Maya's kidneys respond when extra acids threaten to lower her blood pH? Explain what each kidney action does.

4. Why are both the lungs and kidneys useful when exercise changes blood pH? Explain how their roles differ over time.

3 YOUR TURN

Your own words

After a long hike, a student is dehydrated and has extra acid from hard exercise. The student drinks water and rests. Write a brief note explaining how the kidneys help during recovery and why urine volume alone cannot show whether blood pH is stable.

Kidneys on Call

PART 1 · READ AND MARK

Underline each change that could disturb blood pressure or pH, then circle the kidney response to it. Give each change and its matching response the same number to show the connection. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How does losing water in sweat lead to a kidney response that supports Maya's blood pressure? Trace the steps from the change in blood volume to the change in urine.	**Sweating can lower blood volume and pressure. The kidneys release renin, leading to more aldosterone; they return more sodium and water to the blood, so less water leaves in urine and blood volume can recover.**
2	If Maya's blood volume rises after dinner, how can her kidneys help bring her blood pressure back toward its usual range?	**The kidneys can let more sodium and water leave in urine. Losing extra fluid lowers blood volume, helping pressure return toward its usual range.**
3	How do Maya's kidneys respond when extra acids threaten to lower her blood pH? Explain what each kidney action does.	**The kidneys release H^+ into urine, removing acid, and return bicarbonate to the blood, where it helps buffer acid.**
4	Why are both the lungs and kidneys useful when exercise changes blood pH? Explain how their roles differ over time.	**The lungs remove carbon dioxide quickly. The kidneys adjust acid excretion and bicarbonate in the blood more slowly, helping maintain pH over time.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Dehydration can lower blood volume and pressure. The kidneys conserve sodium and water, so less water leaves in urine while drinking helps restore blood volume. They also release H^+ into urine and return bicarbonate to the blood to help correct the acid buildup. As the student rehydrates, the kidneys can let more extra water leave. Urine volume shows how much water leaves, but not whether enough acid is being removed to keep blood pH stable.

Accept equivalent explanations that connect a change in blood volume or pH to a kidney adjustment and its stabilizing effect. For Part 3, look for separate explanations of water handling and acid handling, including why urine volume does not establish blood pH.