Heat at Breakfast

Use everyday observations as evidence for thermal energy transfer.

HS-PSII-2.3 "Cite evidence from everyday life to describe the transfer of thermal energy by conduction, convection, and radiation."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline one observation that supports conduction, circle two observations that support convection, one in water and one in air, and write 1 beside an observation that supports radiation.

A Kitchen Full of Heat

1 On a chilly Saturday, Maya cooks breakfast while watching where thermal energy goes. Conduction moves energy through direct contact. Convection carries energy as a liquid or gas moves. Radiation moves energy by electromagnetic waves and needs no contact or moving fluid. Maya places a metal skillet on an electric burner. A drop of water on the skillet soon sizzles, although the burner never touches the drop. The skillet is hot where it meets the burner, then heat spreads across its metal base. A silicone handle cover stays much cooler than the exposed metal near the skillet.

2 Next, Maya warms water in a clear pot to make tea. At first, the water near the bottom grows warmer. After adding loose tea, she notices tiny tea leaves drifting upward near the center and sinking along the cooler sides. The moving water carries thermal energy from the bottom toward the surface. Above the pot, a thin ribbon of steam rises. Maya holds a light strip of paper above the pot. The strip lifts as warm air moves upward. It falls again after she turns off the burner and the air cools.

3 While the tea steeps, morning sunlight crosses the kitchen table. One section of the dark tabletop lies in a bright patch. A nearby section stays in a book's shadow. Maya touches both sections with the back of her hand and finds the sunlit section warmer. The two sections share the same room air, and nothing hot is touching the bright patch. When Maya moves the book off the table, the previously shaded section slowly warms too. The sunlight traveled from the Sun through space and the window before reaching the table. Space contains almost no matter to carry heat by contact or flowing air.

2 ANSWER WITH EVIDENCE

Use the passage

1. How does thermal energy move from the electric burner into the skillet? Cite a detail from the passage.

2. What evidence shows that moving water transfers thermal energy through the pot? Name the process.

3. What does the paper strip reveal about thermal energy transfer in the air above the pot? Name the process.

4. Which observations support radiation as the reason the tabletop warms?

3 YOUR TURN

Your own words

Choose one everyday situation not described in the passage. In three sentences, identify a conduction, a convection, and a radiation transfer in that situation, giving an observable clue for each.

ANSWER KEY

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HIGH SCHOOL · HS-PSII-2.3

PART 1 · READ AND MARK

Underline one observation that supports conduction, circle two observations that support convection, one in water and one in air, and write 1 beside an observation that supports radiation. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How does thermal energy move from the electric burner into the skillet? Cite a detail from the passage.	**Conduction transfers energy into the skillet because its metal base directly touches the hot burner.**
2	What evidence shows that moving water transfers thermal energy through the pot? Name the process.	**Tea leaves rise near the center and sink along the cooler sides, showing the water moves as it carries thermal energy. This is convection.**
3	What does the paper strip reveal about thermal energy transfer in the air above the pot? Name the process.	**The strip lifts as warm air moves upward above the pot. The moving air carries thermal energy by convection.**
4	Which observations support radiation as the reason the tabletop warms?	**The sunlit section is warmer than the shaded section, and the shaded section warms after Maya moves the book. Sunlight can transfer energy by radiation across space.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

At a campfire, conduction warms my hand when I hold a hot metal mug, and its handle feels warm. Convection carries warm air upward above the fire, where I can see smoke rising with it. Radiation warms my face when I turn toward the fire, while my back feels cooler.

Accept other passage details when they support the named process. For Part 3, each clue should fit its process, and the situation must differ from those in the passage.