Where Heat Begins

Use observations to explain different ways heat is produced.

4.3.a "Construct an explanation using evidence to support the claim that heat can be produced in many ways."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline three observations that show something grew warmer, and circle the action or energy source linked to each one.

A Day of Warm Discoveries

1. At the bike rack, Mina notices that her bike's metal rim is warmer after she uses the brakes. The brake pads rub against the rim to slow the wheel. Some of the bike's moving energy becomes heat. Across the yard, sunlight shines on a dark bench. By noon, the sunny seat feels warmer than a seat in the shade because it has absorbed sunlight.

2. Inside, Mina's dad puts bread in an electric toaster. The wires inside the toaster glow, and the bread turns brown. Electrical energy changes into heat in the wires, which warm the bread. Later, at a cookout, wood burns in a fire. The fire warms the air around it. Burning wood releases stored chemical energy as heat and light.

3. On a cold evening, Mina takes two disposable hand warmers out of a sealed package. Air enters each warmer, and iron powder inside reacts with oxygen in the air. Soon, the warmers feel warm in her hands. This chemical reaction gives off heat without a flame. The toaster also warms things without a flame, but it uses electricity instead of a reaction with air.

2 ANSWER WITH EVIDENCE

Use the passage

1. How does the bike rim give evidence that rubbing can produce heat? Tell what changed and what caused it.

2. What evidence supports the claim that electricity produces heat in the toaster?

3. How does the cookout fire support the claim that stored energy can produce heat?

4. What evidence shows that the hand warmers produce heat without a flame?

3 YOUR TURN

Your own words

Describe two new objects or actions, not named in the passage, that produce heat in different ways. Write three sentences: make a claim, then give one observation and its cause for each example.

ANSWER KEY

Where Heat Begins

GRADE 4 · 4.3.a

PART 1 · READ AND MARK

Underline three observations that show something grew warmer, and circle the action or energy source linked to each one. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How does the bike rim give evidence that rubbing can produce heat? Tell what changed and what caused it.	**The rim became warmer after the brake pads rubbed against it. Some of the bike's moving energy became heat.**
2	What evidence supports the claim that electricity produces heat in the toaster?	**The toaster's wires glow and the bread turns brown. Electrical energy becomes heat in the wires.**
3	How does the cookout fire support the claim that stored energy can produce heat?	**The fire warms the nearby air. Burning wood releases stored chemical energy as heat.**
4	What evidence shows that the hand warmers produce heat without a flame?	**The warmers feel warm after air enters them. Iron powder reacts with oxygen, giving off heat without a flame.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Heat can be produced in different ways. When I rub my hands together, they feel warmer because friction turns motion into heat. An electric hair dryer blows warm air when switched on because electrical energy produces heat inside it.

Accept other passage-based observations and causes that correctly connect evidence to heat production. For Part 3, accept two examples not named in the passage that use different ways to produce heat, with an observation and a correct cause for each.