Patterns That Cool

Use repeated evidence to explain heating and plan a tested solution.

8.5.A "identify and apply patterns to understand and connect scientific phenomena or to design solutions;"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each sentence that states a repeated pattern or a cause-and-effect connection. Number 1, 2, and 3 beside the three stages the science club used to design and test its solution.

Hot Surfaces, Cooler Choices

1. On a clear September day, students at Mesa Middle measured surface temperatures at noon. The blacktop basketball court was 52°C, a grass field was 31°C, and a concrete walkway was 43°C. At 3 p.m., each surface was cooler, yet blacktop was still warmest and grass was coolest. The repeated order mattered more than one measurement. It showed a pattern: darker, less plant-covered surfaces absorbed more solar energy and became hotter than surfaces where water in plants could help cool the area.

2. Researchers can use this pattern to connect several observations. A warm blacktop area heats the air just above it, so people nearby may feel hotter than the air temperature reported for the whole neighborhood. When many roofs, roads, and parking lots have similar surfaces, the same pattern contributes to an urban heat island, a city area that is warmer than nearby rural land. The cause is not simply "city versus country." Surface material, color, shade, and vegetation affect how much energy is absorbed or released.

3. At Mesa Middle, the science club used the measurements to plan a cooler waiting area near the court. They did not assume that one change would work everywhere. First, they predicted that shade would lower the surface temperature during sunny hours. Next, they chose light-colored paving and planted trees beside benches. Finally, they planned to measure the old and new areas at the same time on several clear days. Repeated measurements would reveal whether the design changed the temperature pattern, rather than producing a one-day accident.

2 ANSWER WITH EVIDENCE

Use the passage

1. What repeated temperature pattern did students find for the warmest and coolest surfaces?

2. Use the passage to explain why someone standing near blacktop may feel hotter than the neighborhood air temperature suggests.

3. How can the surface pattern at Mesa Middle help explain an urban heat island?

4. Why did the science club plan to measure the old and new areas at the same time on several clear days?

3 YOUR TURN

Your own words

Choose a sunny place at your school that becomes uncomfortable. Write four sentences: state a surface-temperature pattern you predict, name two design changes based on that pattern, and explain how you would test whether the changes worked.

ANSWER KEY

Patterns That Cool

GRADE 8 · TEKS 8.5.A

PART 1 · READ AND MARK

Underline each sentence that states a repeated pattern or a cause-and-effect connection. Number 1, 2, and 3 beside the three stages the science club used to design and test its solution. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What repeated temperature pattern did students find for the warmest and coolest surfaces?	**Blacktop was the warmest surface, and grass was the coolest surface at both measurement times.**
2	Use the passage to explain why someone standing near blacktop may feel hotter than the neighborhood air temperature suggests.	**The warm blacktop heats the air just above it, making the nearby area feel hotter.**
3	How can the surface pattern at Mesa Middle help explain an urban heat island?	**When many roads, roofs, and parking lots absorb solar energy like blacktop, they can make a city area warmer than nearby rural land.**
4	Why did the science club plan to measure the old and new areas at the same time on several clear days?	**Matching the time and weather makes the comparison fair. Repeated measurements can show whether the design changed the temperature pattern instead of showing a one-day difference.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I predict that the dark asphalt outside the cafeteria will be hotter than the nearby grass at lunchtime. I would add a shade sail and replace part of the asphalt with light-colored pavers. On clear days, I would measure both surfaces before and after the changes at the same time. Lower temperatures after the changes would support my prediction.

Accept equivalent descriptions of the repeated heating pattern and evidence-based connections between surface properties and local temperature. For Part 3, accept reasonable predictions and designs if the student includes two changes and a fair, repeated comparison plan.