

Cooler Playground Plan

Use evidence and models to explain a pattern and evaluate a solution.

6.3.A “develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;”

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each piece of data or model evidence, circle the proposed solution, and write 1 beside the prediction that would test it.

Why Is the Blacktop Hot?

- ① At Lincoln Middle School, students investigated why the blacktop near the playground felt hotter than grass at lunch. On a sunny day, they placed identical thermometers on blacktop, grass, and a concrete walk. They recorded surface temperature after 20 minutes. Their table showed the blacktop was hottest. To explain the pattern, students used equal-sized trays with different covers under same lamp.

SURFACE TEMPERATURES AFTER 20 MINUTES IN SUN

Surface	Temperature
Blacktop	48°C
Grass	31°C
Concrete walk	39°C

- ② The model supported an explanation. The black-covered tray became warmest, while the white-covered tray stayed coolest. Dark surfaces usually absorb more incoming sunlight and change more of that energy into thermal energy. Light surfaces reflect more sunlight. The tray model controlled tray size and light exposure, so material color was the main changed variable.
- ③ Based on the data and model, the students proposed a light-colored shade sail over part of the blacktop. It would block sunlight, so less radiant energy would reach the surface. They predicted that a shaded test area would be cooler than nearby uncovered blacktop at the same time. They would measure both areas on several sunny days.

2 ANSWER WITH EVIDENCE Use the passage

1 Which temperature data support the claim that the blacktop was hotter than the other surfaces?

2 How did the tray model help students explain the temperature pattern?

3 Use the scientific idea in the passage to explain why a dark surface can become warmer in sunlight.

4 What result would support the students' prediction about the shade sail?

3 YOUR TURN Your own words

At noon, uncovered pavement was 45°C and pavement beneath an awning was 32°C; in a lamp model, an uncovered black tray reached 43°C and a shaded black tray reached 30°C. Write exactly three sentences that explain the pattern using the data and model, propose a solution, and state a testable prediction.

PART 1 • READ AND MARK

Underline each piece of data or model evidence, circle the proposed solution, and write 1 beside the prediction that would test it. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Which temperature data support the claim that the blacktop was hotter than the other surfaces?	The blacktop was 48°C, compared with 39°C for concrete and 31°C for grass.
2	How did the tray model help students explain the temperature pattern?	The model showed that the black-covered tray became warmest and the white-covered tray coolest while tray size and light exposure were controlled.
3	Use the scientific idea in the passage to explain why a dark surface can become warmer in sunlight.	Dark surfaces absorb more incoming sunlight and change more of that energy into thermal energy.
4	What result would support the students' prediction about the shade sail?	The shaded blacktop test area would be cooler than nearby uncovered blacktop when measured at the same time.

PART 3 • YOUR TURN (SAMPLE ANSWER)

The 32°C pavement under the awning, compared with 45°C uncovered pavement, and the 30°C shaded tray, compared with 43°C uncovered tray, support the idea that shade blocks sunlight and lowers energy absorbed by the black surface. The school should install an awning over more of the waiting area. At noon on several sunny days, shaded pavement should be cooler than nearby uncovered pavement.

Accept explanations that correctly use the temperature comparisons, the controlled tray model, and the idea that shade reduces incoming sunlight. For the open response, accept another practical cooling solution if it is supported by the given data or model and includes a measurable prediction.