Shade by Design

A community problem becomes a testable solution

FSL.2.2 "Use an engineering design process to identify a problem within the local community and propose and develop a possible solution to that problem.*"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the community problem and the team's design goal. Circle each constraint, then number the team's proposed solution, test, and planned revision in order.

A Cooler Place to Wait

1. At Cedar Bend's clinic bus stop, riders wait beside a wide stretch of pavement with no shade. During a July afternoon visit, a student team saw people step away from the stop sign to stand in the shadow of a nearby building. That shadow disappeared before the bus arrived. The team defined its problem as reducing sun exposure where people actually wait, not lowering the town's air temperature. Riders asked for shade that would still leave room for wheelchairs and walkers. The transit office required a clear sidewalk and approved structures before anything could be installed.

2. The team considered planting a tree and adding a roof over the waiting area. A tree could provide shade later, but it would take years to grow and might interfere with underground pipes. A roof could shade riders sooner, but its supports could block the sidewalk. The team proposed a roof attached to an existing wall, pending permission and a safety review. To test the idea without installing anything, they built a small model from cardboard. A desk lamp stood in for the sun, and two identical dark tiles stood in for pavement, one under the roof and one uncovered.

3. After 15 minutes under the same lamp, the uncovered tile measured 38°C and the shaded tile measured 31°C. The lower surface temperature supported the roof idea, but the model did not show how hot a person would feel or whether the wall could hold a real roof. When the team moved the lamp to a low angle, light reached the waiting spot beneath the model roof. They planned to extend one edge, repeat the angled-light test, and ask an engineer to check the wall and safe clearance. Rider feedback and transit approval would come before any installation.

2 ANSWER WITH EVIDENCE

Use the passage

1. What problem did the team decide to solve? Name one requirement their solution must meet.

2. Why did the team choose to test a roof instead of relying on a tree? What possible problem with a roof did they consider?

3. How did the tile test support the roof idea, and what could that test not show?

4. What did the low-angle lamp test reveal? What did the team plan to change and test next?

3 YOUR TURN

Your own words

Choose a local problem other than shade at a bus stop. In one paragraph, describe evidence of the problem, a measurable goal, one constraint, a solution you could prototype, how you would test it, and one revision you might make if it fails.

ANSWER KEY

Shade by Design

PART 1 · READ AND MARK

Underline the community problem and the team's design goal. Circle each constraint, then number the team's proposed solution, test, and planned revision in order. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What problem did the team decide to solve? Name one requirement their solution must meet.	**The team aimed to reduce sun exposure where riders wait. The solution must leave room for wheelchairs and walkers, keep the sidewalk clear, or receive transit approval.**
2	Why did the team choose to test a roof instead of relying on a tree? What possible problem with a roof did they consider?	**A roof could provide shade sooner than a tree, which would take years to grow. Roof supports could block the sidewalk.**
3	How did the tile test support the roof idea, and what could that test not show?	**The shaded tile measured 31°C, compared with 38°C for the uncovered tile. The test could not show how hot a person would feel or whether the wall could support a real roof.**
4	What did the low-angle lamp test reveal? What did the team plan to change and test next?	**Light reached the waiting spot under the model roof. The team planned to extend one edge and repeat the angled-light test.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

At our school, students often miss the first minute of class while waiting at one water refill station. I would count wait times for three school days before making a change. My goal is to cut the median wait below two minutes without blocking the hallway. I would prototype signs directing students to a second station, then time waits at both stations during the same passing period. If the line stays long, I would move the signs closer to the stairwell and test again.

Accept other passage-supported requirements and limitations in the short answers. For the open task, look for a distinct local problem, a measurable goal, a realistic constraint, a testable solution, and a revision tied to the test result.