

Shade by the Numbers

Connect temperature data to a city planning proposal.

CCSS.ELA-Literacy.RH.9-10.7 "Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each number or measurement in the passage. Circle the words that explain what the data means or how planners use it, then draw a line from one number to its explanation.

Mapping Heat at Bus Stops

- ① On a July afternoon, students at Mesa Vista High mapped temperatures across their neighborhood. At 3:00 p.m., a shaded bus stop beside mature trees measured 88°F, while a stop with no shade measured 101°F. The difference did not surprise science teacher Lena Ortiz. Asphalt and dark roofs absorb sunlight, then release stored heat into the air. Trees change that pattern in two ways: their leaves block direct sun, and water evaporating from leaves cools nearby air. The map showed that heat is not spread evenly across one city block; surfaces and shade shape what people feel.
- ② City planners used the student map alongside a 2021 study of 108 U.S. urban areas. The study, published in Nature Communications, found that neighborhoods with less tree cover were often hotter than greener neighborhoods, although local conditions also mattered. In Mesa Vista, the hottest stops were near wide roads and large parking lots, where little shade reached the pavement. The coolest stops were not simply the places with the most trees. One stop under a fabric canopy measured 90°F, showing that built shade can reduce exposure too. Still, the 13-degree gap between the two original stops gave planners a clear reason to examine where shade was missing.
- ③ After reviewing the evidence, the city's transportation office proposed three changes. First, it would plant trees at stops that had enough soil and sidewalk space. Second, it would add canopies where underground pipes, narrow sidewalks, or overhead wires made trees impractical. Third, it would use lighter-colored pavement during scheduled repairs, because light surfaces reflect more sunlight than dark asphalt. The proposal did not promise that one solution would work everywhere. Instead, it combined temperature measurements with observations of each location. Planners also noted that shade matters most when riders are waiting outside, so they ranked stops used by many passengers during the afternoon.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 How do the 88°F and 101°F measurements support the explanation of how trees affect heat at a bus stop?

2 What pattern connects the 2021 study with the observations from Mesa Vista? Include the limitation described in the passage.

3 Why is the 90°F fabric-canopy stop important evidence for planners? Use both the measurement and the description of the stop.

4 How does the transportation office combine quantitative and qualitative evidence when choosing changes for bus stops?

3 YOUR TURN _____ Your own words

Write a 3-sentence recommendation for a bus stop that measures 98°F at 3:00 p.m., has a narrow sidewalk and overhead wires, and serves 120 afternoon riders. Use the temperature, at least one site detail, and evidence from the passage to explain your recommendation.

PART 1 • READ AND MARK

Underline each number or measurement in the passage. Circle the words that explain what the data means or how planners use it, then draw a line from one number to its explanation. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	How do the 88°F and 101°F measurements support the explanation of how trees affect heat at a bus stop?	The shaded stop was 13°F cooler than the unshaded stop. This supports the explanation that tree leaves block direct sun and evaporation from leaves cools nearby air.
2	What pattern connects the 2021 study with the observations from Mesa Vista? Include the limitation described in the passage.	Both show that places with less tree cover or shade can be hotter. The passage also says that local conditions matter, so tree cover alone does not determine a stop's temperature.
3	Why is the 90°F fabric-canopy stop important evidence for planners? Use both the measurement and the description of the stop.	The 90°F measurement shows that a stop can be cooler with built shade. The fabric canopy supports the idea that canopies can reduce heat exposure where trees are not possible.
4	How does the transportation office combine quantitative and qualitative evidence when choosing changes for bus stops?	It uses temperature measurements to identify heat problems and observations such as soil space, narrow sidewalks, pipes, overhead wires, and rider use to choose trees, canopies, or lighter pavement.

PART 3 • YOUR TURN (SAMPLE ANSWER)

The city should install a canopy at this stop and consider light-colored pavement during its next repair. At 98°F, the stop is much hotter than the shaded 88°F location, so riders need protection from direct sun. Because overhead wires and a narrow sidewalk make a tree difficult to plant, a canopy fits the site, especially for the 120 afternoon riders.

Accept answers that accurately connect numerical evidence to a qualitative explanation, observation, or planning choice. For the open task, accept a different reasonable recommendation if the student uses the 98°F measurement, a site detail, and passage evidence.