Cooling City Surfaces

Study how technical vocabulary clarifies a city heat plan.

CCSS.ELA-Literacy.W.9-10.2d "Use precise language and domain-specific vocabulary to manage the complexity of the topic."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline at least six domain-specific terms and circle three precise verbs that explain how a heat-reduction strategy works.

Planning for Cooler Neighborhoods

1 On a July afternoon, a dark roof can become far hotter than the surrounding air. That heat does not stay on the building. It moves indoors, increasing the demand for air conditioning, and it warms the air above the neighborhood. This pattern is part of the urban heat island effect, in which pavement, roofs, and other built surfaces absorb solar radiation and release heat slowly. City planners study the effect because higher temperatures can raise energy costs and increase heat-related health risks, especially in neighborhoods with few trees or limited access to cooling.

2 One response is a cool roof, a roof covered with materials that reflect more sunlight and absorb less heat than conventional dark roofing. The material's solar reflectance indicates how much incoming sunlight it sends back, while its thermal emittance describes how efficiently it releases absorbed heat. A roof with high values for both measures can keep its surface cooler. That change can reduce heat transfer into the building, which may lower cooling loads. However, planners must consider installation cost, roof condition, and local climate before predicting energy savings.

3 Cool roofs are not a complete solution. Trees provide shade, and their leaves cool nearby air through transpiration, the release of water vapor. Permeable pavement can also help because it allows water to enter the ground rather than collecting heat on a sealed surface. For this reason, an effective heat plan combines strategies. A city might prioritize reflective roofing on large warehouses, plant trees along bus stops, and replace selected parking areas with permeable materials. Using several interventions addresses both surface temperature and the unequal exposure of residents who spend time outdoors or lack reliable indoor cooling.

2 ANSWER WITH EVIDENCE

Use the passage

1. What two domain-specific terms name the measurements used to assess a cool roof material? State what each term measures.

2. Which precise phrase explains why a cooler roof may reduce the need for air conditioning?

3. How does the term “transpiration” make the explanation of trees more precise than simply saying that trees cool the air?

4. What exact phrase identifies residents who may face unequal exposure to heat?

3 YOUR TURN

Your own words

Write a 65-to-85-word recommendation for a city block that combines two strategies from the passage. Use at least four domain-specific terms from the passage, explain how one strategy works, and describe one benefit for residents.

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PART 1 · READ AND MARK

Underline at least six domain-specific terms and circle three precise verbs that explain how a heat-reduction strategy works. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What two domain-specific terms name the measurements used to assess a cool roof material? State what each term measures.	**Solar reflectance measures how much incoming sunlight a material sends back. Thermal emittance measures how efficiently it releases absorbed heat.**
2	Which precise phrase explains why a cooler roof may reduce the need for air conditioning?	**"Reduce heat transfer into the building," which may lower cooling loads.**
3	How does the term "transpiration" make the explanation of trees more precise than simply saying that trees cool the air?	**It identifies the process in which leaves release water vapor, cooling nearby air.**
4	What exact phrase identifies residents who may face unequal exposure to heat?	**"Residents who spend time outdoors or lack reliable indoor cooling."**

PART 3 · YOUR TURN (SAMPLE ANSWER)

To reduce the urban heat island effect on a commercial block, the city should install reflective roofing on warehouses and plant trees near bus stops. High solar reflectance will keep roof surfaces cooler, reducing heat transfer into buildings and lowering cooling loads. Tree shade and transpiration will cool the air where riders wait. These interventions can reduce surface temperature while protecting residents who spend time outdoors.

Accept accurate quotations or paraphrases of the passage's technical vocabulary and explanations. For the open response, check for 65 to 85 words, two passage-based strategies, at least four domain-specific terms, a mechanism, and a resident benefit.