Heat Clues Connect

Build knowledge across related texts to evaluate a cooling plan.

10.DSR.D "Regularly engage in reading a series of conceptually related texts organized around topics of study to build knowledge and vocabulary (These texts should be at a range of complexity levels so students can read the texts independently..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB As you read the three texts, number one idea each text adds to the explanation of city heat, then circle each word or phrase that names a heating or cooling process. Use your marks to connect the texts when you evaluate a new solution.

How Cities Heat Up and Cool Down

1. Text 1, Neighborhood observations: On a sunny afternoon, a schoolyard asphalt court can feel far hotter than a nearby grassy field. Asphalt and dark roofs absorb much of the Sun's energy, then warm the air above them. In cities, streets, parking lots, and buildings replace soil and plants. This pattern helps create an urban heat island, a place where built areas are warmer than nearby rural or less developed areas. Shade changes what people experience at ground level. A mature tree canopy blocks sunlight before it reaches pavement, so shaded surfaces usually stay cooler during the day.

2. Text 2, Measuring the pattern: Scientists use several kinds of evidence to study city heat. Thermometers on the ground record air temperature, while satellites estimate land-surface temperature from thermal radiation emitted by surfaces. These measurements are related but not identical. A roof may have a very high surface temperature even when the air measured a few feet above it is lower. Researchers also map impervious surfaces, such as pavement, that do not let water soak into the ground. Less available water means less evaporative cooling, because evaporation uses heat energy. Trees add another cooling process, transpiration, when water vapor leaves their leaves.

3. Text 3, Planning a cooler block: A city team is choosing between painting a warehouse roof white and planting trees along an unshaded bus route. A white roof has higher albedo, meaning it reflects more incoming sunlight than a dark roof. It can lower the roof's surface temperature, but it will not provide shade for people waiting below. Street trees can shade sidewalks and add cooling through transpiration, although young trees need watering and time to grow. The team uses the earlier evidence to propose both actions: reflective roofs can reduce heat absorbed by buildings, and tree canopy can improve outdoor conditions where people walk, wait, and play.

2 ANSWER WITH EVIDENCE

Use the passage

1. How does Text 2 deepen the explanation in Text 1 for why a block with pavement and few plants can stay hot?

2. In Text 2, what does impervious mean? Which nearby phrase supports your meaning?

3. Why would evidence that a white roof has a cooler surface not, by itself, prove that bus riders feel cooler?

4. Which choice in Text 3 gives people at the bus route the most direct cooling benefit? Use two details from the texts to explain.

3 YOUR TURN

Your own words

Imagine your school wants to cool a blacktop lunch area. In exactly three sentences, recommend a two-part plan, explain how each action uses an idea from the texts, and use the word albedo plus either impervious or transpiration.

ANSWER KEY

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GRADE 10 · 10.DSR.D

PART 1 · READ AND MARK

As you read the three texts, number one idea each text adds to the explanation of city heat, then circle each word or phrase that names a heating or cooling process. Use your marks to connect the texts when you evaluate a new solution. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How does Text 2 deepen the explanation in Text 1 for why a block with pavement and few plants can stay hot?	**Text 2 explains that pavement is impervious, so less water is available for evaporative cooling. This adds a water-based explanation to Text 1's description of built areas replacing soil and plants.**
2	In Text 2, what does impervious mean? Which nearby phrase supports your meaning?	**Impervious means not allowing water to pass through or soak in. The supporting phrase is "do not let water soak into the ground."**
3	Why would evidence that a white roof has a cooler surface not, by itself, prove that bus riders feel cooler?	**Surface temperature and air temperature are not identical, and the white roof does not provide shade for people waiting at the bus stop.**
4	Which choice in Text 3 gives people at the bus route the most direct cooling benefit? Use two details from the texts to explain.	**Planting street trees gives the most direct benefit because trees shade sidewalks and cool through transpiration.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The school should replace part of the blacktop with light-colored paving and plant trees beside the eating area. Higher albedo would make the light surface absorb less sunlight, while tree shade would keep sunlight from heating the pavement. Because blacktop is impervious, the school should protect soil around the trees so water can support transpiration.

Accept equivalent explanations that accurately connect ideas across at least two texts. For the open response, accept varied two-part plans if the student uses albedo accurately and accurately explains either impervious surfaces or transpiration in exactly three sentences.