City Heat Detectives

Read a technical text for claims, evidence, and limits.

CCSS.ELA-Literacy.RST.9-10.10 "By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline sentences that make a claim about urban cooling, and number the details that explain, limit, or qualify each claim. Use your marks to track how the technical text builds a careful conclusion.

Measuring Heat in Cities

(1) On a sunny afternoon, pavement and dark roofs can become much hotter than nearby parks. This difference helps create an urban heat island, a pattern in which built areas retain more heat than vegetated surroundings. Asphalt, brick, and roofing absorb solar energy during the day, then release some of it after sunset. Trees and soil often remain cooler because shade limits heating and water can evaporate from leaves and ground. Scientists measure the effect with air-temperature sensors, surface-temperature instruments, and satellite images. Each method records a different part of the city's thermal pattern.

(2) Air temperature and surface temperature are related, but they are not interchangeable. A metal roof may have a far higher surface temperature than the air measured one meter above it. For this reason, a satellite map showing hot surfaces cannot by itself tell researchers how warm people feel at street level. Wind, humidity, building shade, and the timing of measurements also influence local conditions. Researchers therefore compare several kinds of observations and state what each can and cannot show. This caution matters when cities decide where to add trees, install reflective roofs, or open cooling centers during heat waves.

(3) Not every cooling strategy works equally well in every location. Reflective roofing can lower a roof's surface temperature by sending more sunlight back into the atmosphere, yet it mainly affects the building area where it is installed. Tree planting can provide shade and, when trees have adequate water, can cool through evaporation. However, young trees do not immediately provide the canopy of mature trees, and planting sites may be limited by underground pipes, narrow sidewalks, or available soil. A city planning team must interpret temperature data alongside maps of residents, land use, and infrastructure. The strongest plan identifies both a likely benefit and a practical limit for each strategy.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why might scientists use more than one method to measure an urban heat island? Answer using information from paragraph 1.

2. What distinction does paragraph 2 make between surface temperature and air temperature, and why does that distinction limit what a satellite map can show?

3. What condition affects whether trees can cool through evaporation? Explain what the condition means for a city considering tree planting.

4. Compare the limits of reflective roofing and tree planting described in paragraph 3.

3 YOUR TURN

Your own words

Write a 90 to 110 word field-note summary for a city planning team. Make one claim about how the team should use heat information, include two specific details from the passage, and explain one limitation or qualifier.

ANSWER KEY

City Heat Detectives

HIGH SCHOOL · RST.9-10.10

PART 1 · READ AND MARK

Underline sentences that make a claim about urban cooling, and number the details that explain, limit, or qualify each claim. Use your marks to track how the technical text builds a careful conclusion. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why might scientists use more than one method to measure an urban heat island? Answer using information from paragraph 1.	**Scientists use multiple methods because air-temperature sensors, surface-temperature instruments, and satellite images each record a different part of the city's thermal pattern.**
2	What distinction does paragraph 2 make between surface temperature and air temperature, and why does that distinction limit what a satellite map can show?	**A surface, such as a metal roof, can be much hotter than the air above it. A satellite map shows hot surfaces, so it cannot alone show how warm people feel at street level.**
3	What condition affects whether trees can cool through evaporation? Explain what the condition means for a city considering tree planting.	**Trees need adequate water to cool through evaporation. A city cannot assume tree planting will provide that cooling benefit if trees do not have enough water.**
4	Compare the limits of reflective roofing and tree planting described in paragraph 3.	**Reflective roofing mainly affects the building area where it is installed. Tree planting may be limited because young trees provide little immediate canopy and sites may be blocked by pipes, narrow sidewalks, or insufficient soil.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

City planners should use several kinds of heat data before choosing cooling projects. A satellite image can reveal hot roof and pavement surfaces, but it cannot alone show the air temperature people experience at street level. Reflective roofs reduce surface heating where they are installed, while trees add shade and can cool through evaporation when water is available. Tree planting has limits: young trees offer little immediate canopy, and pipes or narrow sidewalks can restrict sites. A useful plan would match each strategy to local measurements, resident needs, land use, and infrastructure.

For the open response, accept any 90 to 110 word summary with a clear claim, two accurate passage details, and one accurate limitation or qualifier.