



Part 1: Research Student Directions

Your Assignment:

Did you know that Seattle has been named among the top ten cities with the worst evidence of being an “Urban Heat Island?” You have been asked to write an editorial for the local newspaper explaining what an urban heat island is, why this is a problem and what we can do to decrease Seattle’s summer temperatures. You will gather information from a variety of sources to write your editorial.

Steps you will follow:

To plan and compose your editorial, you will do all the following:

1. Watch two videos, read an NPR interview, an EPA report and two data charts.
2. Answer three questions about the sources.
3. Plan and write your editorial.



Directions for beginning:

You will now watch two videos read two article and view a couple of charts to learn about urban heat islands. Take notes because you may want to refer to your notes while writing your essay. You can refer to any of the sources as often as you like.

Source Information:

- | | |
|-----------|---|
| Source 1: | Video #1 - <i>What is the Heat Island Effect?</i> (3:13)
https://www.youtube.com/watch?v=5HX2WRPmQdY |
| Source 2: | Video #2 - <i>Urban Heat Islands</i> on The Weather Channel (4:52)
https://www.youtube.com/watch?v=srbpv3c9ryU |
| Source 3: | NPR Interview, September 5, 2012, Richard Harris |
| Source 4: | Urban Heat Island Reduction. EPA, August 29, 2013 |
| Source 5: | Charts illustrating the Urban Heat Island Effect |



Performance Task: The Urban Heat Island Effect



Source	What is an Urban Heat Island?	Why is this a problem?	What can we do about it?
Video #1: What is an Urban Heat Island?			
Video #2: Urban Heat Islands			



Note-Taking: The Urban Heat Island Effect

Source	What is an Urban Heat Island?	Why is this a problem?	What can we do about it?
Reading #1: NPR Interview			
Reading #2: EPA Urban Heat Island Reduction			
Reading #3: Charts illustrating the Heat Island Effect			



Performance Task: The Urban Heat Island Effect



SOURCE #3: Reading

NPR Interview

September 4, 2012 Interview by Richard Harris NPR

More than 20,000 high-temperature records have been broken so far this year in the United States. And the heat is especially bad in cities, which are heating up about twice as fast as the rest of the planet.

High temperatures increase the risk of everything from asthma to allergies and can even be deadly. But a researcher in Atlanta also sees this urban heat wave as an opportunity to do something about our warming planet.

The story starts at Ebenezer Baptist Church, arguably the most famous place in Atlanta; it was Martin Luther King Jr.'s church and the heart of the civil rights movement.

It's now playing an unexpected role in a new movement: the struggle against rapidly rising urban temperatures. Cities are literally global hot spots.

Brian Stone Jr., director of the [Urban Climate Lab](#) at Georgia Tech, leads us into a huge green space next to the church. The two-block community garden is leased out by Wheat Street Baptist, another nearby church.

"The impetus for this was to have local food production, as we see in a lot of communities," Stone says. "But the centralization of this, literally less than a mile from downtown Atlanta, is unique."

And it's not simply a garden. It's a summer camp at the moment, and an urban farm brimming with okra, onions, tomatoes and arugula, among other vegetables.

It's an island of calm that actually helps offset some of the heat that builds up so dramatically in the concrete all around us. That's not to say it's actually cool on a midsummer day.

Stone says it actually accomplishes much more than meets the eye. Open, vegetated space like this helps water evaporate throughout the day. And evaporating water carries away heat. Like sweat, it's nature's air conditioning, but we've managed to interrupt that process in cities. The result is called the urban heat island effect, and it's adding to our warming woes.

The Problem Is Now

Cutting down trees is a big factor. Pavement also stores heat during the day and makes cities hotter at night. And as cities heat up, air conditioners run harder. Their exhaust heat also pushes up the temperature. It all adds up — a lot — according to Stone's research on American cities.

"Not only are most cities heating up more rapidly than the planet, they tend to be heating up at double the rate," he says. (This is detailed in [his book](#), *The City and the Coming Climate*.)

And if this trend continues, if the planet heats up 4 degrees in the coming decades, cities will heat up a blistering 8 degrees.

Brian Stone Jr., director of the Urban Climate Lab at Georgia Tech, says that pavement stores heat during the day and makes cities hotter at night. Cities, he says, tend to be heating up at double the rate of the rest of the planet.



Performance Task: The Urban Heat Island Effect



Green spaces and water features, like this new one behind Ponce de Leon Avenue in Atlanta, are ways cities can help combat rising temperatures. Trees provide shade, and evaporating water helps cool the air.

"That raises some significant public health issues, significant infrastructure issues," he says. Extreme heat is potentially deadly to vulnerable populations. And it can cause infrastructure headaches ranging from power outages to warped rail tracks.

"This isn't just a problem for 100 years from now; this is a problem for today," Stone says.

But he isn't all gloom and doom, because there are ways to ease this. His own lifestyle is at the extreme end of what you can do: He has solar panels on his roof, and he commutes on an electric scooter, which he charges off his solar cells.

What Cities Can Do

But Atlanta residents don't have to be as dedicated as Brian Stone to make a difference. We pull up to a beautiful new park behind one of the city's defining avenues, Ponce de Leon.

Stone walks past grassy areas toward a large pond with a fountain in the middle — a far cry from Ponce de Leon's fabled fountain of youth, but still beneficial.

Water evaporates from the pond and cools the area. But that's not why the city built it. It's part flood control, part neighborhood beautification, part recreation site. But Stone says if you just plan with a little care, those sorts of amenities can also counteract urban warming.

Trees can help more than anything else, both by providing shade and by evaporating water through their leaves. But Stone has no illusions that this will be a simple task.

"We will need to plant millions of trees around Atlanta to measurably reduce temperatures around the city, and that's a tremendous challenge," he says. "But what's advantageous is that's fully within the control of the city itself."

A thick canopy of trees can easily drop air temperature by 20 or 30 degrees, compared with a paved parking lot, Levine says. His small organization can manage to plant 3,000 trees and 3,000 saplings a year. That's far short of the millions that urban planner Brian Stone says the city could ultimately use, but it's a start.

Here, in the humid grips of a midsummer Atlanta day, the expression "think global, act local" doesn't seem quite so worn.





Urban Heat Island Effect Reduction

Many communities are taking action to reduce urban heat islands using four main strategies: 1) increasing tree and vegetative cover, including installing green roofs (also called "rooftop gardens" or "eco-roofs"), 2) installing cool—mainly reflective— roofs, and 3) using cool pavements.

Benefits of Heat Reduction

The extent to which urban areas can benefit from heat island reduction strategies depends on a number of factors—some within and some outside of a community's control. Although prevailing weather patterns, climate, geography, and topography are beyond the influence of local policy, decision makers can select a range of energy-saving strategies that will generate multiple benefits, including vegetation, landscaping, and land use design projects, and improvements to building and road materials.



Trees and Vegetation: Trees, vegetation, and green roofs can reduce heating and cooling energy use and associated air pollution and greenhouse gas emissions, remove air pollutants, sequester and store carbon, help lower the risk of heat-related illnesses and deaths, improve stormwater control and water quality, reduce noise levels, create habitats, improve aesthetic qualities, and increase property values.

Trees and vegetation lower surface and air temperatures by providing shade. Shaded surfaces, for example, may be 20–45°F (11–25°C) cooler than the peak temperatures of unshaded materials.

Trees and vegetation are most useful as a heat reduction strategy when planted in strategic locations around buildings or to shade pavement in parking lots and on streets. Researchers have found that planting deciduous trees or vines to the west is typically most effective for cooling a building, especially if they shade windows and part of the building's roof.

The use of trees and vegetation in the urban environment brings benefits beyond reducing temperatures including:

- Reduced energy use: Trees and vegetation that directly shade buildings decrease demand for air conditioning.
- Improved air quality and lower greenhouse gas emissions: By reducing energy demand, trees and vegetation decrease the production of associated air pollution and greenhouse gas emissions. They also remove air pollutants and store and sequester carbon dioxide.
- Enhanced stormwater management and water quality: Vegetation reduces runoff and



Performance Task: The Urban Heat Island Effect



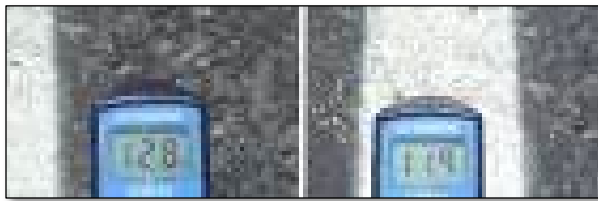
improves water quality by absorbing and filtering rainwater.

- Reduced pavement maintenance: Tree shade can slow deterioration of street pavement, decreasing the amount of maintenance needed.



Cool Roofs and Cool Pavement:

- Cool roofs are roofs that reflect the sunlight rather than absorb it. Thus, light energy is reflected and not absorbed. The less light absorbed the cooler the roof stays. The lighter the roof absorbs the hotter it gets. Light energy from the sun transforms into heat (thermal) energy in the roof. Cool roofs are typically light in color to reflect the sunlight. They can lower cooling energy use, peak electricity demand, air pollution and greenhouse gas emissions, heat-related incidents, and solid waste generation due to less frequent re-roofing.
- Cool pavements also reflect sunlight and can indirectly help reduce energy consumption, air pollution, and greenhouse gas emissions. Depending on the technology used, cool pavements can improve stormwater



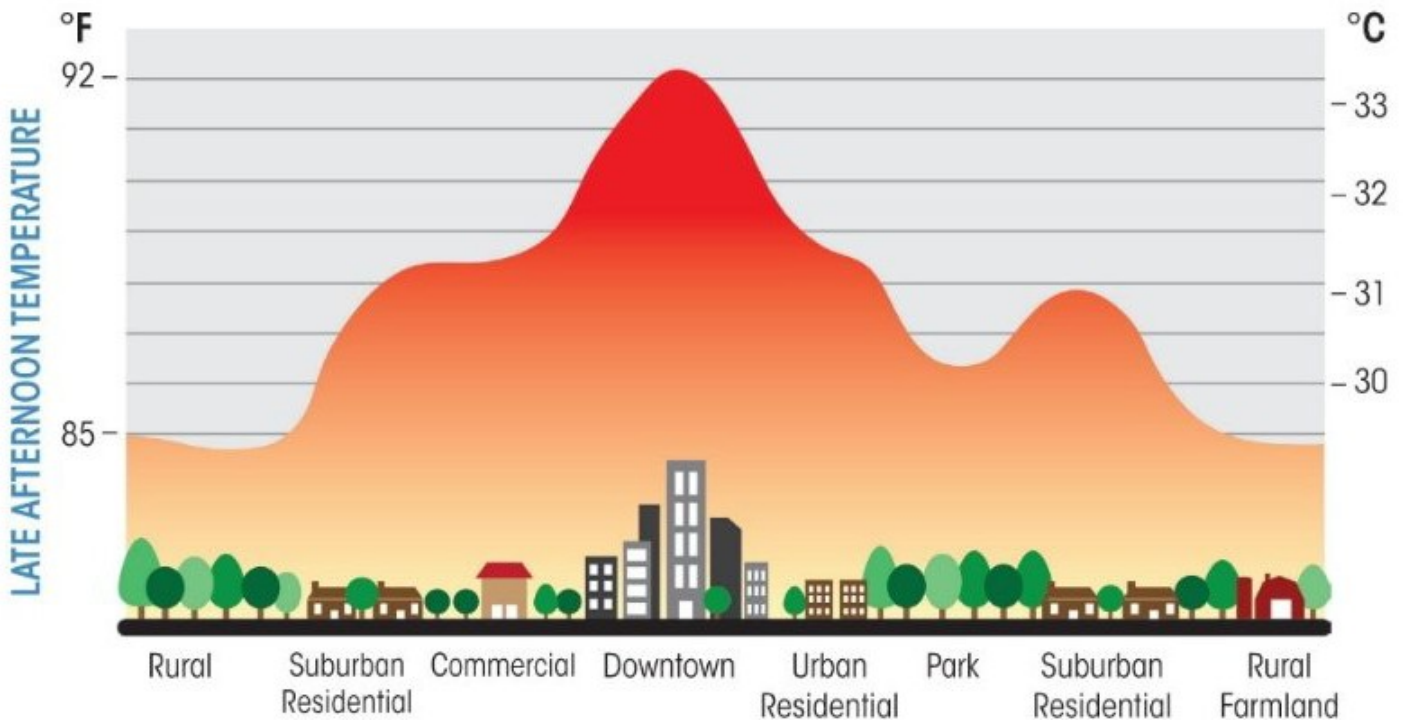
management and water quality, increase surface durability, enhance nighttime illumination, and reduce noise. Cool pavements may be lighter colors or made of permeable material to absorb water during rainstorms. The water helps to keep the pavement cool and the light color reflects the sunlight rather than absorbing it.

Excerpted from EPA's *Reducing Urban Heat Islands: Compendium of Strategies*, August 29, 2013.



Urban Heat Island

Trees for Energy Conservation August 26, 2013



extension.org

Source: <http://www.extension.org/pages/66920/urban-heat-island>



Performance Task: The Urban Heat Island Effect



Part 2: Field Investigation

Students can engage in mapping an urban area and suggesting modifications to reduce the impact of heat from concrete and other surfaces. As an alternative, students can check temperatures around their school building, looking for differences and suggesting ways to reduce the impact of heat on the school campus.

Discussion questions might include the following:

- What do we mean by urban heat islands?
- Why are urban heat islands a concern?
- What is our local town or city doing to minimize urban heat islands?
- What recommendations might we make to our local government to reduce urban heat islands?

In addition, teachers may want to consider one or more of the following field investigations:

- Field Investigation Guide Surface Temperature Investigation
- Designing an Approach for Assessing Your City's Heat Island (EPA):
<https://www.epa.gov/heatislands/measuring-heat-islands#designing>

Other ideas for field investigations:



Performance Task: The Urban Heat Island Effect



Part 3: Essay

Student Directions:

You will now review your notes and sources, plan, draft, and revise your essay. You may use your notes and refer to the sources. You may also refer to the answers you wrote to questions at the end of part 1, but you cannot change those answers. Now read your assignment and the information about how your essay will be scored, then begin your work.



Your Assignment:

You have been asked to write an editorial for the local newspaper, advocating that the city of Seattle come up with a plan for addressing urban heat. Explain what an urban heat island is in your editorial, why this is a problem, and what the city can do to decrease the heat during the summer months. Be sure to provide possible solutions in your editorial. Use information from the sources in your editorial and cite your sources.

How your essay will be scored:

The people scoring your essay will be assigning scores for

- **Statement of Purpose / Focus**– how well you clearly state and maintain your controlling idea or main idea.
- **Organization**– how well the ideas progress from the introduction to the conclusion using effective transitions and how well you stay on topic throughout the essay.
- **Elaboration of Evidence**– how well you provide evidence from sources about your topic and elaborate with specific information.
- **Language and Vocabulary**– how well you effectively express ideas using precise language that is appropriate for your audience and purpose.
- **Conventions**– how well you follow the rules of usage, punctuation, capitalization, and spelling.

Now begin work on your essay.

Manage your time carefully so that you can:

- Plan your essay.
- Write your essay.
- Revise and edit for a final draft.





Performance Task: The Urban Heat Island Effect



Planning My Essay

Essay Components
Introduction: Capture the reader's attention
Statement of purpose or controlling idea:
What an urban heat island is:
Why urban heat is a problem:
Solutions to the urban heat island affect:
Conclusion:

Informative / Explanatory Writing Rubric (Grades 6-11)

Scoring Version



Score	4	3	2	1
Statement of Purpose/Focus	<p>The response is fully sustained and consistently and purposefully focused:</p> <ul style="list-style-type: none"> consistent or main idea of a topic is clearly communicated, and the focus is strongly maintained for the purpose, audience, and task 	<p>The response is adequately sustained and generally focused:</p> <ul style="list-style-type: none"> controlling or main idea of the topic is clear, and the focus is mostly maintained for the purpose, audience, and task 	<p>The response is somewhat sustained and may have a minor drift in focus:</p> <ul style="list-style-type: none"> controlling or main idea of a topic may be somewhat unclear, and the focus may be insufficiently sustained for the purpose, audience, and task 	<p>The response may be related to the topic but may provide little or no focus:</p> <ul style="list-style-type: none"> controlling or main idea of the topic may be somewhat confusing or ambiguous; response may be too brief or the focus may drift from the purpose, audience, and task
Organization	<p>The response has a clear and effective organizational structure creating unity and completeness:</p> <ul style="list-style-type: none"> consistent use of a variety of transitional strategies to clarify the relationships between and among ideas effective introduction and conclusion logical progression of ideas from beginning to end; strong connections between and among ideas, with some syntactic variety 	<p>The response has an evident organizational structure and a sense of completeness, though there may be minor flaws and some ideas may be loosely connected:</p> <ul style="list-style-type: none"> adequate use of transitional strategies with some variety to clarify the relationships between and among ideas adequate introduction and conclusion adequate progression of ideas from beginning to end; adequate connections between and among ideas 	<p>The response has an inconsistent organizational structure, and flaws are evident:</p> <ul style="list-style-type: none"> inconsistent use of transitional strategies with little variety introduction and conclusion, if present, may be weak uneven progression of ideas from beginning to end; and/or formulaic; inconsistent or unclear connections between and among ideas 	<p>The response has little or no discernible organizational structure:</p> <ul style="list-style-type: none"> few or no transitional strategies are evident introduction and conclusion, if present, may be missing frequent extraneous ideas may be evident; ideas may be randomly ordered or have an unclear progression
Elaboration of Evidence	<p>The response provides thorough and convincing support/evidence for the controlling idea and supporting idea(s) that includes the effective use of sources, facts, and details.</p> <ul style="list-style-type: none"> comprehensive evidence from sources is integrated; references are relevant and specific effective use of a variety of elaborative techniques* 	<p>The response provides adequate support/evidence for the controlling idea and supporting idea(s) that includes the use of sources, facts, and details:</p> <ul style="list-style-type: none"> adequate evidence from sources is integrated; some references may be general adequate use of some elaborative techniques* 	<p>The response provides uneven, cursory support/evidence for the controlling idea and supporting idea(s) that includes uneven or limited use of sources, facts, and details:</p> <ul style="list-style-type: none"> some evidence from sources is weakly integrated, imprecise, or repetitive; references may be vague weak or uneven use of elaborative techniques*; development may consist primarily of source summary 	<p>The response provides minimal support/evidence for the controlling idea and supporting idea(s) that includes little or no use of sources, facts, and details:</p> <ul style="list-style-type: none"> evidence from the source material is minimal or irrelevant; references may be absent or incorrectly used minimal, if any, use of elaborative techniques*
Language	<p>The response clearly and effectively elaborates ideas, using precise language:</p> <ul style="list-style-type: none"> vocabulary is clearly appropriate for the audience and purpose effective, appropriate style enhances content 	<p>The response adequately elaborates ideas, employing a mix of precise with more general language:</p> <ul style="list-style-type: none"> vocabulary is generally appropriate for the audience and purpose generally appropriate style is evident 	<p>The response elaborates ideas unevenly, using simplistic language:</p> <ul style="list-style-type: none"> vocabulary is uneven or somewhat ineffective for the audience and purpose inconsistent or weak attempt to create appropriate style 	<p>The response is vague, lacks clarity, or is confusing:</p> <ul style="list-style-type: none"> vocabulary is limited or ineffective for the audience and purpose little or no evidence of appropriate style

Score	2	1	0
Conventions	<p>The response demonstrates a command of conventions:</p> <ul style="list-style-type: none"> adequate use of correct sentence formation, punctuation, capitalization, grammar usage, and spelling 	<p>The response demonstrates partial command of conventions:</p> <ul style="list-style-type: none"> limited use of correct sentence formation, punctuation, capitalization, grammar usage, and spelling 	<p>The response demonstrates little or no command of conventions:</p> <ul style="list-style-type: none"> infrequent use of correct sentence formation, punctuation, capitalization, grammar usage, and spelling

NS	Unintelligible, in a language other than English, off-topic, insufficient evidence (incomplete) or copied text. (Off-purpose writing will still receive a score in Conventions.)
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*Elaborative techniques may include the use of personal experiences that support the controlling idea.