



Task: Summer in the City - Urban Heat Islands



PART 1: Research Student Directions

Your Assignment:

Your city planner is asking for ideas for how to keep the city cooler in the summer. Cities become Urban Heat Islands, places that are much warmer than the surrounding countryside. Your job is to understand what an urban heat island is, how the heat is created, and ways to make the city cooler. You will gather information from three sources to write an essay for the city planner, making suggestions for ways to cool the city in the summer.

Steps you will be following:

To plan and write your essay you will do all the following:

1. Watch a video, read an article, and interpret two data charts.
2. Answer three questions about the sources.
3. Plan and write your essay.



Directions for beginning:

You will now watch a video, read the article, and interpret the two data charts to learn about Urban Heat Islands. Take notes on each of the sources using the tool provided. You may refer to your notes when you answer the research questions and write your essay. You may also refer to the sources as often as you like.

Source Information:

Source #1: Video: *What is an Urban Heat Island?* Fox 9 Local News TV Station (3:13)
<https://www.youtube.com/watch?v=RBgZlHnZZGI>

Source #2: Article: *The Urban Heat Island Effect*. Adapted from EPA's Reducing Urban Heat Islands: Compendium of Strategies, August 29, 2013

Source #3: Charts that show the Urban Heat Island Effect



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Note-Taking Tool

Source	What is an Urban Heat Island?	Why is this a problem?	What can we do about it?
Source #1: Video - What is an Urban Heat Island?			
Source #2: Article - The Urban Heat Island Effect			
Source #3: Charts illustrating the Urban Heat Island Effect			



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Article: The Urban Heat Island Effect

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

Did you ever wonder why it is hotter in the city than in the country in the summertime? Cities act like heat islands in the summer. The roofs and pavement absorb light energy from the sun. This light energy changes into heat energy in the roof or on the pavement. The heat energy causes the temperatures to rise. Darker colors absorb more light and get hotter than light colors. The more light that is absorbed into the roofs and pavement, the hotter it gets. This process is called the Urban Heat Island Effect.

City planners search for ways to reflect sunlight rather than absorbing it. Here are some ideas:

1. Plant more trees and other forms of vegetation

Trees and other plantings lower the temperature by providing shade. Shaded areas can be as much as 20 degrees cooler than unshaded areas. Trees and other vegetation should be planted around the buildings, the parking lots, and the streets. Afternoon sun is even stronger than morning sunlight. Therefore, planting trees to the west of buildings has an even greater effect in reducing the amount of sunlight that is absorbed.



City planners can also use the roofs of buildings for plantings. These “green roofs” absorb sunlight for photosynthesis and shade the roof making the roof



cooler. The less sunlight absorbed by the roof, the cooler the roof stays. Trees planted on roofs may seem strange to you, but they will keep the building cooler. Trees on roofs also reduce air pollution, help to filter the water, create homes for animals, reduce street noise, and they look beautiful!



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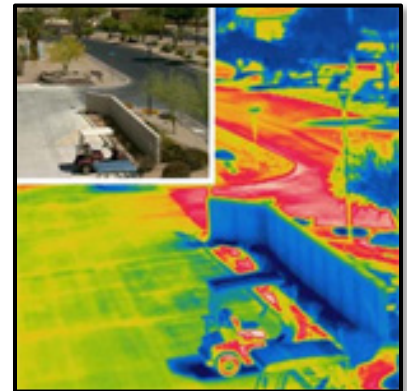
2. Use building materials that keep roofs and pavements cool.

Cool roofs are roofs that reflect sunlight rather than absorb it. The more sunlight the roof absorbs, the hotter it gets. Light energy from the sun changes into heat energy in the roof. Cool roofs and pavement are typically light in color. Light colors reflect sunlight while dark colors absorb sunlight.



Cool roofs can lower the need for air conditioning. This saves money on electricity and reduces air pollution. Another benefit is that cool roofs need to be replaced less often. This saves money and means less waste. Replacing a roof is expensive and creates lots of garbage for our landfills!

Cool pavements, like cool roofs, can also reflect light and reduce the need for air conditioning. Depending on the materials used, cool pavements can improve stormwater management by absorbing the water in a rainstorm. Otherwise, the water picks up pollution as it runs down the streets. Light colored materials can also be used on streets. Lighter colors are easier to see in the dark, and they reflect light rather than absorbing it.



There is a lot we can do to reduce the Urban Heat Island Effect. Careful planning is the key to a healthier urban environment. Many people suffer from the heat, especially those that are elderly. By designing a city that includes trees, plants, cool roofs, and cool streets, we can reduce the need for air conditioning, thus saving energy and reducing air pollution. We can help to keep our water clean by using plants and special pavement to filter out the pollution. Another important benefit is that we will enjoy a more beautiful environment! Trees, plantings, and light colors will reduce the Urban Heat Island Effect and make our cities more livable!





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Urban heat island effect over a city relative to buildings and greenspaces with trees. Temperatures decrease from 86 °F to 74 °F as greenspaces increase.

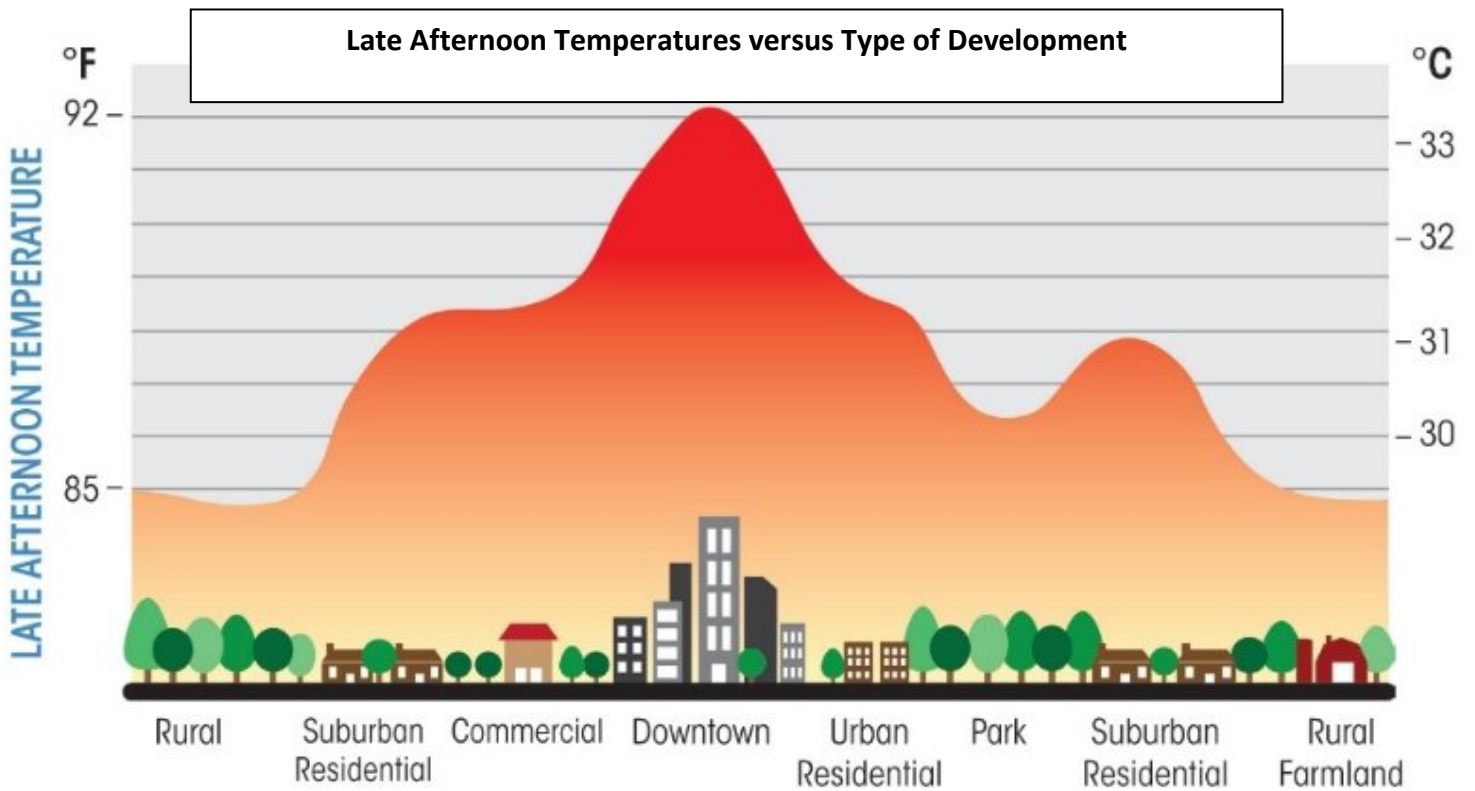


Photo and image credit: extension.org <http://www.extension.org/pages/66920/urban-heat-island>



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Questions

Answer the three questions in the space provided below them. Refer to your sources and your notes for information.

- 1. Explain what the urban heat island effect is and why it happens. Use details from two of the sources in your response. Cite your sources. *(Claim 4, Target 2)*.



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2. Evaluate which of the sources, the charts, the video, or the article is most helpful in explaining the urban heat island effect. Use details from each of the three sources to support your opinion. Cite your sources. (Claim 4, Target 3).



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3. Explain why we should plant more trees and other vegetation in our local city, even on the roofs of buildings! Use details from two of the sources to support your position. Cite your sources. *(Claim 4, Target 4).*



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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:

- Learn About Heat Islands (EPA) -- includes resources, webcasts, case studies, data, and measurement links: <https://www.epa.gov/heat-islands/learn-about-heat-islands>

Other ideas for field investigations:



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PART 3: Essay

You will now review your notes and sources, plan, draft, and revise your essay. You may use your notes and refer to the sources. Now read your assignment and the information about how your essay will be scored.



Your Assignment:

Write a letter to your city planner explaining the Urban Heat Island Effect, why this is a problem, and what your city can do to decrease heat during the summer months. Be sure to provide specific ideas for reducing the urban heat island effect in your letter. Use information from the sources. Be sure to cite your sources.

How your essay will be scored:

The people scoring your essay will be assigning scores for:

1. **Statement of Purpose/Focus**– how well you clearly state and maintain your controlling idea or main idea.
2. **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.
3. **Elaboration of Evidence**– how well you provide evidence from source about your topic and elaborate with specific information.
4. **Language and Vocabulary**– how well you effectively express ideas using precise language that is appropriate for your audience and purpose.
5. **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





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Essay Planning Tool

Introduction: Capture the reader's attention

Statement of purpose controlling idea:

What the urban heat island effect is:

Why urban heat is a problem:

Solutions to the urban heat island effect:

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	<p>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.)</p>
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*Elaborative techniques may include the use of personal experiences that support the controlling idea.