

## Understanding Urban Heat Islands

1. Why would you feel warmer on a hot sunny day wearing a black tee-shirt compared to wearing a white tee-shirt?

*Dark colors such as black absorb more heat than light colors.*

2. What affects the temperature in a city?

*The amount of vegetation (such as trees and grass) and colors of building materials affect temperatures in a city.*

3. What types of **building materials** found in a city **absorbs** and **reradiates** the greatest amount of heat?

*Asphalt in parking lots and on rooftops.*

4. What types of **building materials** found in a city **reflects** heat?

*White roofing shingles or cement.*

5. What is an **urban heat island**?

*When heat builds up in a city, it creates a hot spot compared to the nearby suburban and rural areas. This hot spot is called an urban heat island.*

6. According to the sketch of an urban heat island profile, what types of areas **absorb and release the least** amount of heat?

*Rural and rural farmland areas.*

7. According to the sketch of an urban heat island profile, what types of areas **absorb and release the most** amount of heat?

*Downtown areas absorb and release the most amount of heat. Commercial and urban residential also absorb and release large amounts of heat.*

8. List 3 things that communities can do to **reduce the impacts** of urban heat islands.

*(1) Planting trees and vegetation; (2) Installing cool or vegetated green roofs; and (3) Switching to cool paving materials.*

9. How can planting trees in a city **reduce** the city's temperature?

*Trees, shrubs, and other plants shade buildings, intercept solar radiation, and cool the air by evapotranspiration.*

10. What is **evapotranspiration**?

*Evapotranspiration occurs when plants secrete or transpire water through pores in their leaves.*

11. List 4 ways trees can benefit the environment?

*(1) Branches and leaves provide shade and reduce wind speed; (2) Leaves filter dangerous pollutants from the air; (3) Evapotranspiration from leaves cools the surrounding air; (4) Roots stabilize soil and prevent erosion; (5) Roots, leaves, and trunks provide habitat for animals; (6) Leaves and branches absorb sound and block erosion causing rainfall.*

12. What is a **cool roof**? How does a **cool roof** keep material cooler and help reduce the heat island effect?

*The term "cool roof" is used to describe roofing material that has high solar reflectance. These materials reflect a large portion of the sun's energy. Cool roofs also may have a high thermal emittance and release a large percentage of absorbed heat. This keeps the material cooler and helps to reduce the heat island effect.*

13. What are **cool paving materials** and how can they **reduce** a city's temperature?

*Cool paving materials reduce the absorption of solar heat and later transfer of this heat to the surroundings.*

*Lighter-colored paving materials come in shades of white, beige, light gray and terra cotta.*

*Permeable pavements can be constructed from a number of materials including concrete and asphalt, filled with soil, gravel, and grass.*

*Cool paving materials reduce the absorption of solar heat and later transfer of this heat to the surroundings.*

14. Why is using a light-colored paved area for a city plaza a better choice than a dark, colored asphalt paved area?

*Lighter-colored materials have higher solar reflectance, so they absorb less of the sun's energy and stay cooler.*

15. How do porous (or permeable) pavements reduce heat?

*Porous (or permeable) pavements allow water to filter into the ground, keeping the pavement cool when moist.*

16. Imagine you were given 10 million dollars to reduce the heat island effect in your city. What would you do to most effectively **reduce** the city's temperature?

*Answers will vary. A combination of strategies that include (1) Planting trees and vegetation; (2) Installing cool or vegetated green roofs; and (3) Switching to cool paving materials would be a highly effective strategy.*