Cool Surfaces Worksheet

1. In the Cool Surfaces Animated Video, you learned about the urban heat island (UHI) effect. Take a look around the neighborhood where you live or go to school. Do you think either your home or school has been impacted by the UHI effect? Have you ever personally experienced the impacts of the UHI effect? If yes, then how?
2. “Cool murals” made with solar-reflective paint are one example of how communities are getting creative to beat the heat. What are some other creative ideas that you can come up with to help your community stay cool?
3. Do you think that a home or building in a colder climate could benefit from cool surfaces in their communities? Why or why not?
4. True or False? Thermal Emittance means how good a material is at storing heat it’s already absorbed.

\_\_\_\_\_ True

\_\_\_\_\_ False

1. True or False? The radiative property, Solar Reflectance, is the amount of sunlight that bounces off a surface.

\_\_\_\_\_ True

\_\_\_\_\_ False

1. Sunlight reaches the earth in three ways: Ultraviolet, Visible, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ radiation.
   1. Interweb
   2. Solar
   3. Infrared
   4. Thermal
2. True or False? For a material to be considered “cool” it must be white or light in color.

\_\_\_\_\_ True

\_\_\_\_\_ False

1. What is it called when the sun heats up the outside of a building and some of the heat makes its way inside the building?
   1. Solar Reflectance
   2. Solar Heat Gain
   3. Thermal Emission
   4. Urban Heat Island (UHI) Effect
2. The opposite of Solar Reflectance is \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   1. Solar Absorptance
   2. Solar Emittance
   3. Thermal Reflectance
   4. Climate Change

Answer Key

1. Short answer
   1. Answers will depend on the individual location.
2. Short answer
   1. Possible answers could include, but are not limited to: painting parking lots, basketball courts, etc. with reflective coatings; vegetated roofs/rooftop gardens; shading structures; tree and garden planting.
3. Short answer
   1. While this topic is not addressed in detail in the Cool Surfaces Animated Video, this question is an opportunity for students to think critically about how well cool surfaces might work in different climates. In truth, many factors influence energy cost savings from cool roofs and walls, including solar reflectance, type of roof or wall covering, climate, and insulation. You can find more information in the CRRC’s document [*How Does a Cool Roof Save Energy?*](https://coolroofs.org/documents/CRRC-EnergySavingDoc_2023_v2.pdf)On the other hand, cool roofs and walls help improve resilience to heat and mitigate the urban heat island effect during hot times, regardless of climate.
4. False. Thermal Emittance means how good a material is at *releasing* heat it’s already absorbed.
5. True
6. C. Infrared
7. False. Darker materials can have cooling properties if they are made with special pigments that reflect infrared light.
8. B. Solar Heat Gain
9. A. Solar Absorptance