Name_____ Period_____ Date_____

CONCEPTUAL PHYSICS | **Activity**

22 Heat Transfer: Conduction and Radiation

I'M MELTING! I'M MELTING!

Purpose

In this activity, you will investigate curious heat transfer ability of different surfaces.

Required Equipment and Supplies

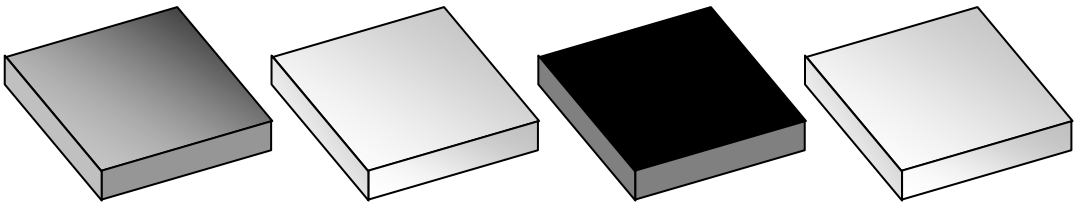
defrosting tray, black
defrosting tray wrapped tightly in aluminum foil
foam tray, black
foam tray wrapped tightly in aluminum foil
four ice cubes of similar size
paper towel

Discussion

If you walk around the house with bare feet, you probably notice that a tile floor feels much colder than a carpeted floor or rug. It's hard to believe that they might actually have the same temperature. The tile feels colder because it is a better conductor than carpet. Heat is conducted from your warmer feet to the cooler floor faster when the floor is tile than when the floor is carpet. So your feet are cooled faster by tile than they are by carpet at the same cool temperature. In this activity, you will see which kinds of surfaces transfer heat most rapidly.

Procedure

Step 1: Set the defrosting tray, defrosting tray covered in aluminum foil, white Styrofoam plate, and blackened Styrofoam plate out on your table.



a **b** **c** **d**

Figure 1. a. defrosting tray, **b.** defrosting tray covered in aluminum foil, **c.** white Styrofoam plate, **d.** blackened Styrofoam plate

1. Which surfaces feel colder and which ones feel warmer? (Just touch a corner; don't transfer too much of your own body heat to any of the objects.)

Step 2: In a moment, you will set an ice cube on each of the surfaces. When you do, they will begin melting. Before you set the ice cubes out, make some predictions.

2. Which ice cube will melt most quickly? The one on the black-surfaced metal, foil-wrapped metal, black foam, or foil-wrapped foam?

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3. Which ice cube will melt most slowly?

Step 3: Set the ice cubes out on their respective surfaces quickly. Observe the ice cubes for several minutes (preferably until the fastest-melting ice cube melts completely).

4. Which ice cube melted most quickly?

5. Which ice cube is melting most slowly?

Summing Up

1. How do your observations compare to your predictions?

2. Which way did heat flow in this activity? (From what to what?)

3. Which surfaces were conductors and which were insulators?

4. What advantage—in terms of heat transfer—did one metal tray have over the other?

5. What advantage—in terms of heat transfer—did one foam tray have over the other?

6. Which of the following conclusions are supported by your observations and which are not? Give evidence from this activity to justify your conclusion.

   a. "Metal objects transfer heat faster than foam objects."

   b. "Black surfaces transfer heat faster than shiny surfaces."