D1 ACTIVITY 2: MELTING ICE

Background

This activity is designed to teach students to identify the variables that influence heat conduction. By allowing students to see with their own eyes the influence of different materials on the transfer of thermal energy between bodies at different temperatures, the lesson gives them a chance to develop a deeper understanding of the nature of insulation and the rationale behind classifying materials according to their ability to conduct heat.

Suggested approaches:

- Before laying out the ice cubes, ask the students to touch the plates and discuss the sensations of warmth and cold that arise from touching different materials. This is a good stage to talk about body temperature.
- At the beginning of class, distribute **D1.2 WORKSHEET B: ICE MELTING**. Students can fill in the first two questions immediately, and complete the rest of the sheet as the ice cubes melt.
- As the ice cubes are been placed on the plates, ask students to **predict** which will melt first. The predicted order of melting can then be compared with the observed results.

Equipment required:

- Seven different plates:
  - ✔ ***Three aluminium, each of a different thickness and area***
  - ✔ ***One wood***
  - ✔ ***One Plexiglas***
  - ✔ ***One Styrofoam***
  - ✔ ***One marble***

  (substitute for other construction materials where these are not available)
- One surface temperature sensor
- Seven ice cubes of identical size and shape
- **D1.2 WORKSHEET B: INSULATION MATERIALS**, one per student (Alternatively, they can just make notes in their copybooks.)

What to do:

1. Lay each of the plates out on a table. Use pieces of folded paper to label the plates A, B, C, D, E, F and G as shown in Figure 3.

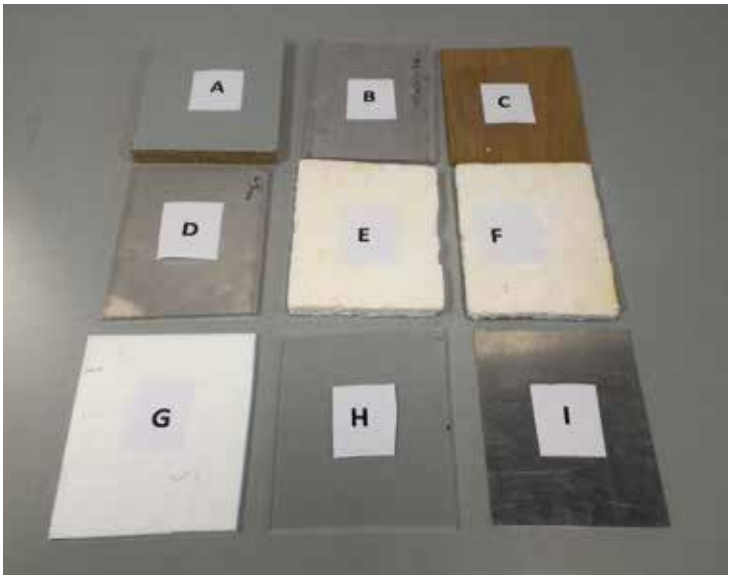

Figure 3

2. Write a list of the plates on the blackboard or whiteboard. **DISTRIBUTE D1.2 WORKSHEET B: INSULATION MATERIALS** and ask the students to follow the instructions. Alternatively ask them to make a list in their copybooks.
3. Take the initial temperature of each of the plates and record it on the board.
4. Place an ice cube on each plate and start the timer.
   - ***Discuss the concepts of thermal equilibrium and heat transfer with the class.***
   - ***Take predictions about which ice cube will melt first.***
5. Once the cube **starts** to melt stop the timer. Take the temperature of the plate and make a note of it.
6. When every ice cube has completely melted, **discuss the results** with the class and compare them with the predictions. Ask them to make hypotheses about the influence of **different materials** and **different** variables on melting times.
7. Elaborate on the concept of thermal conduction by discussing with the students how to analyse the different variables influencing the results.