a WOW Lab BLUEPRINT

'c' is for Chocolate

Activity Instructions

The following items will be needed for this activity:

- chocolate bars on cardboard tray (see *Prep Instructions*)
- microwave
- refrigerator
- ruler

Step 1

Remove the chocolate bars from the refrigerator and place them in the microwave, aligned parallel to the microwave door **(Figure 1**). Microwave the chocolate on high for 90 seconds. If surface melting is not visible after 90 seconds, continue heating the chocolate in ten-second increments until the surface of the bars begins to melt.

Figure 1

Step 2

Keeping the cardboard level, remove the chocolate from the microwave. The cardboard may be warm at this point, but not hot enough to burn. **Figure 2** provides an example of dark chocolate melted at the antinodes, while **figure 3** shows milk chocolate melted at the antinodes. The milk ingredients increase the conduction of heat through the chocolate and result in antinodes which melt broadly.

Figure 2

Figure 3

Step 3

Carefully place the chocolate and cardboard tray back into the refrigerator to harden the chocolate (**Figure 4).**

Figure 4

Step 4

After the chocolate has hardened, use a ruler to measure the distance between the melted antinodes in the chocolate. Some melted regions should be separated by a distance of approximately 12 cm. This distance corresponds to the wavelength of the microwaves.

Step 5

Check the safety label located at the back of the microwave to determine the frequency of the electromagnetic waves in MHz or GHz. Most standard microwave ovens emit waves at a frequency of 2.45 GHz (2.45×10^9 Hz).

Step 6

Using the formula $\lambda f = v$, the experimentally measured wavelength may be used to calculate the speed of light. If the microwave and refrigerator are food safe, the chocolate may now be eaten.