

Measure the Speed of Light using Chocolate!

Level: Grades (6-8)

Credit: Activity adapted by NSO from Planet Science / Planet-Science.com
<http://www.planet-science.com/categories/over-11s/physics-is-fun!/2012/01/measure-the-speed-of-light-using-chocolate.aspx>

Objective

Students will be able to...

Measure and calculate for the speed of light by observing microwaves and their effect on chocolate

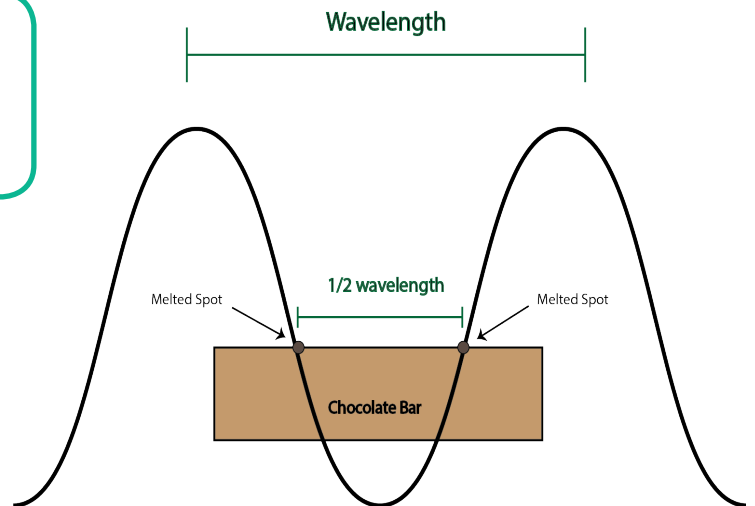
Standard

MS-PS4-1.

Use mathematical representations to describe a simple model for waves

Materials

- Microwave oven
- Ruler
- Bar of Chocolate



Theory

Microwaves are a type of electromagnetic radiation and thus, they travel at the speed of light. By measuring the speed at which microwaves are traveling, you will get the approximate speed of light.

Speed of light can be calculated by:

[Speed = wavelength (cm) x frequency (Hz)]

Wavelength = the distance between two melted spots on the bar of chocolate (this equals half a wavelength) x 2

Frequency is determined by the microwave model. Standard microwave models have a frequency of 2.45 gigahertz (GHz) or 2,450,000,000 (Hz)

Procedure

1. Take the turning plate out of the microwave. The chocolate bar must be still while it heats.
2. Cover the rotating piece in the microwave with an upside down plate.
3. Place the chocolate bar in the middle of the plate.
4. Heat the chocolate until you see it start to melt in two or three places. This should take about 20 seconds.
5. Carefully remove the chocolate from the microwave and measure the distance between the melted spots.
6. Determine the frequency of your microwave. Standard microwave models have a frequency of 2.45 GHz or 2,450,000,000 Hz. If necessary, consult your microwave manual to determine frequency.

Calculation

Use your measurement for distance between melted spots and the microwave's frequency to calculate for speed of light:

D = Distance between melted spots (cm)

F = Microwave Frequency (Hz)

S = Speed of light (cm/s)

$$S = 2 \times D \times F$$

Speed of Light = _____

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