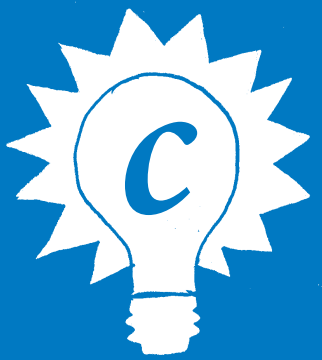
SCIENCE
CHALLENGE

13

MEASURE THE SPEED OF LIGHT



THE
JAMES
DYSON
FOUNDATION

MEASURE THE SPEED OF LIGHT

SCIENCE CHALLENGE 13

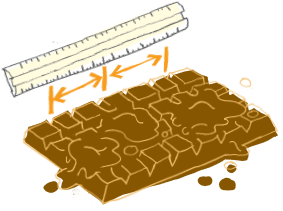
Designed by Joe,
Design engineer at Dyson

The brief

Measure the speed of light using chocolate and a microwave oven.

The method

1. Remove the glass plate in the base of the microwave and replace with an upturned ceramic plate. You want your chocolate to stay still in this experiment.
2. Place the chocolate in the middle of the plate.
3. Turn on the microwave and heat the chocolate until it melts in 2 or 3 places. This should take about 20 seconds.
4. Using gloves, and with adult supervision, carefully remove the plate from the microwave.



5. Measure the distance, in metres, between the melted spots on the chocolate bar.
6. The distance you measured is half a wavelength. Multiply this number by two and then by the frequency of the microwave you are using. This can be found on the outside of the machine. This number is the speed of light in metres per second.

Materials

- A large bar of chocolate
- A microwave (with adult supervision)
- A large ceramic plate
- A ruler

How does it work?

Microwaves work by creating standing waves inside the microwave oven. The water molecules in the chocolate try to align themselves with the rapidly changing standing wave, creating heat. The distance between the two melted spots is half a wavelength. You can now calculate the speed of light, because **speed = wave length x frequency.**