Melting Microwaves

Sections

Joey Scouts | Cub Scouts | Scouts | Venturer Scouts | Rover Scouts

Scouts VICTORIA

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Challenge Areas

COMMUNITY | CREATIVE | OUTDOOR | PERSONAL GROWTH

Scout Method Elements

COMMUNITY INVOLVEMENT | LEARNING BY DOING | NATURE AND THE OUTDOORS | PROMISE AND LAW | PERSONAL PROGRESSION | PATROL SYSTEM

SYMBOLIC FRAMEWORK | YOUTH LEADING, ADULTS SUPPORTING

SPICES Growth Areas

CHARACTER | EMOTIONAL | INTELLECTUAL | PHYSICAL | SOCIAL | SPIRITUAL

The Adventure

Experiment with melting different foods inside your microwave to find out how a microwave really works.

Plan

1. Do you know how a microwave is able to heat your food? It literally sends microwaves, a form of electromagnetic radiation into your food. Do some research to find out more about what electromagnetic radiation is and how a microwave works.
2. Design an experiment to determine the wavelength of the EMR produced by your microwave. You could try melting food in the microwave and measuring the distance between two hot spots to find half a wavelength. A few things to consider in your experimental design:

- Remove the rotating dish from the microwave so that your food remains in the same place the whole time.
- You will need a suitable surface to melt the food on. It should be flat and thick enough that it provides some thermal insulation from the base of the microwave. Cardboard usually works well.
- There are different foods you can try to melt but whatever you choose you will need enough to cover a large enough area (at least 20cm by 20cm).
    - Cheese slices usually work well.
    - Marshmallows work best if you get the mini ones because the big ones swell up too much.
    - If using chocolate avoid baking chocolate or brands with a high melting point.
    - Butter will work but it melts very quickly so keep a close eye on progress.

3. Collect all your required materials and consider how you are going to record your results. Make sure you have read the safety advice and have adult supervision and then you are ready to start your experiment. The equipment you require will depend on the parameters decided upon during your plan.

Do

1. Complete your experiment and record your results.
2. Completing more than one trial will give you more confidence in the reliability of your results.

Review

1. How can you tell if your results are accurate? Check the frequency of your microwave, this will probably be a number given in gigahertz (GHz). If you take the number 30 and divide it by the frequency in GHz you will find the wavelength in centimetres (cm).
2. What have you learnt about microwaves and electromagnetic radiation from this experiment?
3. How could you improve this experiment or do further experimentation into microwaves?

Safety

- Make sure you only put microwave safe materials into the microwave while completing this experiment. Metal objects should never be placed into the microwave because the build-up of charge can cause sparks and fires. If you are using cardboard, you should avoid waxed cardboard.
- Remember the items you remove from the microwave will be hot so wear suitable protective equipment.

Variations

Do you want a bigger mathematical challenge? Try using the data collected from your experiment along with the known frequency of your microwave to calculate the speed of an electromagnetic wave using the information here.