Hertz’s Experiments with Radio Waves

Heinrich Hertz (1857–1894) performed experiments with electromagnetic (EM) radiation. These confirmed many of the predictions that Maxwell had made a few years before.

Sparks ‘On-Air’

To generate the sparks needed for this experiment we use a device called a Wimshurst Generator. This is a really good static electricity generator. For a spark to jump a 1cm gap in air, it needs to have 25,000 Volts. How many volts potential difference is there between the spheres on this machine?

__________________ V

If Hertz saw sparks $\frac{1}{10}$th mm long in his secondary coil, what voltage was being induced?

__________________ V

What is the voltage induced in our secondary coil, as measured on the Oscilloscope?

__________________ V

Identify some properties of light that Hertz may have used in his experiments with radio waves.
A standing wave is a wave that stays in a constant position. We can create standing waves with our rubber rope. Sketch a standing wave and label the Node, Antinode and Wavelength ($\lambda$). A standing wave is how Hertz figured out that all parts of the EM spectrum behaved in the same way as light.

C in a microwave
A microwave oven uses microwave energy to heat food. Microwaves range from as long as one meter to as short as one millimeter. Due to the fact that they are a part of the electromagnetic spectrum we can use them to calculate the speed of light. Follow the instructions to get a calculation of the speed of light.

1. Place fax paper on the foam plate.
2. Dampen fax paper.
3. Place damp fax paper into Microwave oven.
4. Turn Microwave on for 30-45 seconds.
5. Measure distance between hotspots on fax paper and multiply this number by 2
6. Multiply your wavelength ($\lambda$) by your frequency ($f$) in Hertz (Hz) with the formula $v = f\lambda$. Show your working:

The actual value for the speed of light is $2.99 \times 10^8$ m/s. How close were you?